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A COMPARATIVE STUDY OF LIFE IN FIRST GRADE CLASSROOMS  
OF 1:14 AND 1:23 TEACHER/PUPIL RATIOS

by

Karen Anne Kiser-Kling

A Dissertation Submitted to  
the Faculty of the Graduate School at  
The University of North Carolina at Greensboro  
in Partial Fulfillment  
of the Requirements for the Degree  
Doctor of Education

Greensboro  
1995

Approved by

A handwritten signature in cursive script, appearing to read "C. M. Carlucci", written over a horizontal dashed line.

Dissertation Advisor

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APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of the  
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KISER-KLING, KAREN A., Ed.D. A Comparative Study of Life in First Grade Classrooms of 1:14 and 1:23 Teacher/Pupil Ratios. (1995) Directed by Dr. C.M. Achilles. 151 pp.

The purpose of this study was to identify and describe communication interactions between teachers and students in small (1:14 teacher/student ratio) classrooms. The study was conducted in two North Carolina schools in October 1993-May 1994. School A had a 1:14 teacher/pupil ratio in grade 1. School B had a 1:23 teacher/pupil ratio in grade 1 classes.

The sets of class observations were made in grade 1 classrooms using the PIT (for Personal, Institutional and Task events) communication instrument. PIT data were converted to percents. Teachers completed questionnaires about student grouping, parent volunteers, teacher problems, narratives, and teacher exit interviews. Students were tested in reading achievement with the California Achievement Test (CAT).

Grade 1 (1:14) had a consistently high percentage of Task communications throughout the year. Grade 1 (1:23) Task communications decreased and Institutional communications increased as the year progressed.

Grade 1 (1:14) teachers engaged in more individual communication in the beginning of the year moving to group at the end of the year. Grade 1 (1:23) teachers engaged in more group communication in the beginning of the year, moving to individual at the end of the year.

Pupils in the (1:14) had a mean score gain of 11.3 greater than did grade 1 pupils in (1:23) on the CAT. This was statistically significant.

Teachers in small classes report that they have more time to spend with individual students in reading conferences, counseling, conversation and listening. Teachers in small classes report that (1:14) classrooms have a "family like atmosphere" with few discipline problems.

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## CHAPTER I

### INTRODUCTION

The call for public school reform is not a new phenomenon. "Reform reports have appeared regularly since the famed Report of the Committee of Ten in 1893" (Passow, 1989, p. 14). In October of 1957, our nation was alarmed by the Russian satellite Sputnik orbiting the earth. This alarm resulted in the passage of the National Defense Education Act of 1958. This became known as the "The Era of Curriculum Innovation," which spawned projects to strengthen curricula and teaching in the areas of mathematics and science. Reports proclaiming the shortcomings of America's secondary schools were common in the 1970s.

In April of 1983, A Nation At Risk: The Imperatives for Educational Reform was published by the National Commission on Excellence in Education (NCEE). The NCEE was charged to "do all things needed to define the problems of and the barriers to attaining greater levels of excellence in American education" (Passow, 1989, p. 13).

The 1980s were filled with a second wave of reports calling for public school reform. The cry for greater levels of excellence in American public schools still rings out. Never has so much been asked of public education as today.

The public schools are a reflection of our society, and like our society, the public schools deal with guns, violence, drugs, and gangs. Today's children come to school with a myriad of problems such as abuse, inadequate health care, fetal alcohol syndrome, dysfunctional families, and emotional problems.

The demographics of the 1990s indicate that public school children have many needs. Over 25% of America's children live in poverty (Hodgkinson 1991,1992; Hamburg,1992). By 1989, America's young people accounted for 39.5 % of our country's poverty. Reed and Sautter (1990) state that in raw numbers more Americans are poor today than before the War on

**Poverty.** Almost 40 million Americans live in families with income levels below official poverty lines. Children of these families live with sickness, psychological stress, malnutrition, underdevelopment, and daily hardships that affect their young minds and bodies. One in five American children goes to bed hungry, sick, or cold (Reed and Sautter, 1990).

Children of poverty come to school less ready for school than children from nonpoverty, stable backgrounds. These children along with the present trends of mainstreaming and inclusion of special needs children into the regular classroom place added demands for individual attention upon the already overloaded classroom teacher.

Representative Miller warned that the nation's schools could be "overwhelmed" by such problems in 1992. He noted that teachers, counselors, and social workers are already overworked and that none of them "receives the training needed to deal with the complex and difficult problems confronting children and families today" (Reed & Sautter, 1990, p. 6).

How can an overloaded public education system meet the increased demands of our country's children today? One way to address this over-load problem is to adopt a case-load type system with fewer children per classroom teacher. One way to bring this about at an affordable cost is to reduce class size.

#### Statement of the Problem

Since today's children require more teacher attention than did the children of years past, does it make sense to reduce the number of students per class, thus increasing the possibility for attention per child? Small class research has been conducted for many years. Some early studies were short-term, were poorly designed and dealt with large unit reductions (i.e., 45 to 35 pupils). Many researchers and policy analysts have joined in the class-size debate, including: Glass and Smith (1978) in Meta-analysis of Research on the Relationship of Class Size and Achievement; Cahen, Filby, McCutcheon, and Kyle (1983) in Class Size and Instruction; Glass, Cahen, Smith, and Filby (1982) in School Class Size: Research and Policy;

Mitchell, Carson, and Badarak (1989) in How Changing Class Size Affects Classrooms and Students; and Tomlinson, (1988) in Class Size and Public Policy: Politics and Panaceas.

Results of these studies and debates were inconclusive. Yet, common sense and intuition indicate that a teacher with a small class (about 15 pupils) can meet children's needs more effectively than can a teacher working with a regular (about 28 pupils) class. By far the largest and most comprehensive class-size study occurred in 1985-1989 and is still being updated. The state of Tennessee commissioned a major longitudinal study (1985-1989) to investigate the effects of small classes (average one teacher to 15 pupils) on pupil achievement and development in grades K-3. This study was called Project STAR, an acronym for Student - Teacher Achievement Ratio. Results from this study produced a statistically significant class-size effect ( $p. \leq .001$ ) with substantial educational significance as identified by effect sizes (ES) of about .3 to .5 obtained in the early analyses for minority and low SES kindergarten and grade one pupils (Finn & Achilles, 1990). Later analyses after the data were adjusted to assure that small classes had no more than 17 pupils and large classes had no fewer than 22 pupils produced effect sizes of .5 to .7 or more (Achilles, Nye, Boyd-Zaharias, Fulton, and Cain, 1994).

Although STAR provided statistical results and ideas for future work, STAR researchers and other class-size researchers have done little research regarding what actually happens in these small classes. The problem guiding this study is the lack of small-class research and literature describing what teachers and students do in small classes (1:15). In other words, major class-size research (e.g., STAR) has shown what happens when class size is reduced (there is a gain in student test-scores), but has failed to provide much information about why this happens or how teachers teach in these smaller classes.

This present study addresses the questions: How do teachers teach in small classes?; How do teachers communicate with pupils?; and How do teachers of small classes and their pupils spend their time?. This study focuses on teacher behavior and classroom conditions in small classes, and addresses the general question: "What happens in a small class?" The

researcher dealt with this question by looking directly at teachers who were teaching in the small class (about 1:15) and secondly, by comparing the small-class results with the results from analyses of teacher behaviors in a larger class (approximately 1:23) in a comparable school (size, socioeconomic status, and race) in the same school system.

#### Purpose of the Study

The purpose of this study was to begin to find out why student achievement might increase in small classes. What happens between students and teachers in small (approximately 1:15) primary classes and specifically in first-grade classrooms? How do teachers teach in small (1:15) classes? Results from grade one small-class findings were compared with similar data from "regular" grade-one classes (approximately 1:23) and from kindergarten (approximately 1:15) and grade two (approximately 1:20) classes, and to results of prior class-size research as ways to understand the important differences between instruction in small (1:15) and regular (1:23) classes.

#### Research Questions

Questions addressed by this study are:

1. What type(s) and amount of teacher-pupil communications (Task, Institutional, Personal, Mixed) occur in small classes (approximately 1:15) and larger classes (approximately 1:23) in grade one?
2. What are the differences in the types and amounts of teacher-pupil communications (Task, Institutional, Personal, Mixed) between small classes (approximately 1:15) and regular classes (approximately 1:23) in grade one?
3. Did a change in teacher behavior in small classes occur after teachers received some in-service relating to small-class size?
4. What generalizations can be made about teaching in small classes at school A (the focus of the study) as compared with small-class teaching in another system that has used small classes for several years?



5. What are the achievement differences between first graders in the small classes (approximately 1: 15) and the first graders in the regular classes (approximately 1:23)?

#### Context

The main portion of this study was conducted at two schools. At the time of the study (1993-1994) both schools were similar in student population (numbers, race, background, and SES). One school had approximately 1:15 teacher/student ratio in first grade and kindergarten classes and an approximately 1:20 teacher/student ratio in second grades. The comparison school had approximately 1:23 teacher/student ratio in all grades. First grade was the primary emphasis for study in each school. Kindergarten and second grades were reviewed in both schools to help researchers gain a broader perspective of the program in both schools and to help researchers understand any differences that might be found in the schools related to class size.

#### Significance of the Study

The class size debate has been around for quite some time. To date, conflicting findings from the class-size research and literature have emerged. The majority of class-size studies have focused only on the what of small-classes, increased student achievement as measured by standardized tests, usually of reading or of reading and mathematics.

In the late 1970s, Glass and Smith (1978) conducted a meta-analysis of the twentieth-century research and literature on class size and student achievement. The Education Research Service or ERS (1978) reviewed the literature on class size and student achievement. In 1986, Robinson and Wittebols conducted a literature review of class size and student achievement. Student achievement was the focus of the Madden and Slavin (1987) study that examined the effects of small group tutoring (1-3 students) on student achievement. Slavin (1989) used the Glass and Smith data to reanalyze the results. This study centered around student achievement.

Two states conducted major class-size projects. Indiana's PRIME TIME project was implemented to help students and the legislature appropriated funds to study the effects. In their discussion of PRIME TIME, McGiverin, Gilman, and Tillitski (1989) also summarized several studies on student achievement.

The state of Tennessee funded a major study of class size (Project STAR), a project of class-size reduction similar to project PRIME TIME, but with a major research component included. Again, student achievement was the major focus of this study (Word, Johnston, Bain, Fulton, Zaharias, Lintz, Achilles, Folger, and Breda, 1990).

In a few class-size studies, even though student achievement was the major focus, researchers began to look at classroom practices and other involved factors. They began to be concerned about the why and how of increased student achievement found in smaller classes. Smith and Glass (1980) conducted a meta-analysis of research on class size and classroom practices, focusing on teacher attitudes, morale, satisfaction, etc, (Glass et al., 1982). Filby et al. (1980) followed up with a series of case studies of teacher behavior in small classes. Bourke (1986) studied class size, student achievement, and teacher behavior of 63 fifth-grade teachers. Yet, in none of these studies did researchers look directly at teacher and pupil classroom communications or interactions, the heart of teaching.

These studies have increased the body of information regarding the what of small-size classes, student achievement. This present study of small-size first-grade classes will focus on the why and how of teaching small-size classes with a primary emphasis on classroom communication events.

#### Design of the Study

This primarily descriptive study employed elements of both qualitative and of quantitative research to answer what, why, and how questions. The two primary sites were treated to detailed descriptions and analyses characteristic of case study methods. There was some reliance on questionnaire response (tallies, and with descriptive statistical treatment).

The major behavioral data analysis procedure was direct observation of daily teaching, with no attempt at manipulation or intervention. Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) were used to study test-score differences between the two groups of pupils.

### Procedures

Data sources for this study were observation, responses to teacher questionnaires, formal and informal teacher/principal interviews, context and site data, and comparisons of data from this study to findings from other research and literature on class size. The instrument used in the classroom observations to collect teacher and pupil communication data is called the PIT for Personal, Institutional, and Task data categories. The PIT instrument allows researchers to collect data on the teacher and pupil interactions and communication patterns (French & Galloway, nd; Galloway, 1962).

The PIT observational data instrument was modified only slightly by the researchers to facilitate data collection. This instrument divides teacher classroom communication into four types of events: Personal (P), Institutional (I), Task (T), and Mixed (M). Teacher/pupil communication events can be designated i (individual) when the teacher interacts with one person, or g (group) when the teacher interacts with more than one person. For example, the designation "Ig" is an Institutional event to a group; Ti is a Task event to an individual. Teacher communication events are recorded at approximately four - six second intervals. The flow of classroom communication is recorded within the rubric of the PIT system. Short observation periods of 5 - 30 minutes provide "snapshots" of the episodic flow of events in the classrooms being observed. Primary observation times were scheduled so the researchers viewed "academic" subjects such as reading, math, social studies, science, etc.

### Limitations of the Study

When an event is evaluated, the very act of observing may change the event. Student and teacher behavior may have been affected by the presence of an observer(s) in the

classroom. In an effort to reduce this effect, researchers met with faculty members participating in the study to explain the procedures and the purpose of this study. They explained to and showed teachers the types of communication events that were being observed and how the coding process used in the PIT model would be employed. Teachers were assured that they were not being "evaluated", but that researchers were seeking to identify patterns of communication in types of classes.

Another limitation of this study is whether the conclusions from this study can be generalized to other settings. A small number (n) of teachers participated in the study. Classes were observed in person. The choice not to employ a videotaping of classroom interactions meant that specific events could not be re-analyzed. There was no random selection of schools to participate in the study. The participating schools were chosen because certain conditions (1:15 and 1:23 class size) already existed at those sites, and they were matched only on selected variables. There was also no direct intervention provided for the small-class size teachers, although late in the study there was some targeted in-service and visitations related to teaching in classes with 13-16 pupils.

#### Definition of Terms<sup>1</sup>

For the purpose of this study, the following definitions are provided for clarity and consistency:

Behavior. Behavior in this study refers to observable, overt actions, expressions, and statements of pupils and teachers.

Class-size. Class-size in this study refers to the number of students in a classroom supervised by one teacher. There were two class sizes in this study. Classes of about 1:13 - 1:18 were "small" classes; classes of 1:23 - 1:27) were regular class size.

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<sup>1</sup>Unless noted otherwise, definitions were taken from French (1968, pp. 10-11). See Appendix A for copy of PIT instrument.

Communication. Communication in this study refers to the sending and receiving of verbal and nonverbal messages. This process has four minimum requirements: a sender, a channel (verbal and nonverbal behavior), a message (content), and a receiver.

Communication Event. Communication event in this study refers to a sequence of pupil/teacher communicative behaviors set off from preceding and succeeding events (sequences of behaviors) by naturally occurring boundaries. Galloway defines these boundaries as 1) variation or change in the direction of a teacher's communicative behavior; 2) a change in the teacher's behavior toward a new interaction; 3) the occurrence of a significant or potent act that appears influential; and 4) social intervention in which an interruption is instigated by either a pupil or the teacher. Events may be composed of either verbal or nonverbal behaviors or a combination of both. They may be of relatively long or short duration (Crist, 1975).

Institutional Event. An institutional event (designated as I) in this study refers to communication events which focus on managing the classroom and/or meeting the expectations of the educational institution.

Mixed Event. A mixed event (designated as M) in this study refers to a communication event containing elements of any two or more other types of communication events (i. e., personal, institutional, or task).

Nonverbal Behavior. Nonverbal behavior in this study refers to overt actions, gestures, postures, positions, and facial expressions by either teachers or pupils. The term also includes intonation, volume, and character of vocal expression as opposed to content of verbal message.

Personal Event. Personal event (designated as P) in this study refers to a communication event in which the personal needs, goals, and emotions of pupil and/or of the teacher are the central focus.

PIT Model. PIT model in this study refers to a conceptual model of classroom interactions as Personal, Institutional, Task, and Mixed events.

Task Event. Task event (designated as T) in this study refers to a communication event which focuses on the teaching and learning of subject content whether cognitive, affective, or skill oriented.

Verbal Behavior. Verbal behavior in this study refers to the overt statements of pupils and teachers.

1:15. Approximate for small (S) classes of one teacher to thirteen to eighteen students.

1:23. Approximate for regular (R) classes of one teacher to twenty-three to twenty-seven students.

### Organization of the Study

Chapter I of this study consists of a brief introduction to the study, a statement of the problem, context of the study, statement of purpose, statement of design/method, statement of significance, questions addressed by the study, a summary of procedures used in the study, limitations of the study, definition of terms, and this overview of the parts of the study.

Chapter II contains a review of the literature related to the history and current literature of the class-size debate. The review consists of general literature concerning class size, and a review of literature and research specifically concerned with the STAR project.

Chapter III describes the design and procedures used in conducting this study. It discusses the subjects of the study, details (context) of schools and classes, schedules of events, the PIT model used for observing classroom teacher/pupil interaction, the establishment of interrater agreements, details of processes, data collection, and data analysis procedures.

Chapter IV contains the data analysis. It addresses the question listed in Chapter I.

Chapter V presents the summary of the findings listed in Chapter IV and conclusions drawn from these findings. This chapter also includes recommendations for additional research.

## CHAPTER II

### REVIEW OF SELECTED LITERATURE

During the last one hundred years an increasing amount of research has examined the issue of class size. Nevertheless, questions still abound relative to the educational impact of class size. In this period of added demands on public education (educating increasing numbers of children from poverty situations, children of dysfunctional families, sexual abuse, and of drug abuse) could reduced class size be part of the plan to help meet these educational demands for America's young children?

#### History of the Debate

Tomlinson (1988) traced the origin of the debate over what constitutes optimum class size back to ancient Greece. Could it be that by limiting his classes only to the rich young men of Athens, Socrates was keeping his classes purposely small? Socrates' contemporary, Herodotus (5th century, B. C.) "thought the right number was about 30" (Tomlinson, 1988, p. 7). The view of 30 students per one teacher as the optimum class size has survived through the centuries. Not everyone subscribed to this magical number of 30. Comenius (1592-1670) thought that he was wasting his time if the class were smaller than 100 students. Locke (1632-1704) stated that a class size of 50 was impossible to teach, but that 40 students were a tolerable number. President James A. Garfield (1831-1881) defined an ideal university "as one with educational philosopher, Mark Hopkins, seated at one end of a log and a single student (himself) at the other end of the log" (Tomlinson, 1988, p. 7).

Around 1850, the United States was in the midst of a social revolution that warranted the creation of a large public school system. Public school enrollments swelled to massive proportions. Costs of this public school system swelled along with the enrollments. Educators were faced with the same question one hundred years ago as they are faced with today, states

Tomlinson (1988): "balancing the immediate and tangible costs of supplying teachers and classrooms against the abstract and long term benefits of an educated citizenry" (p. 7). One way to manage this cost is to increase the number of students in a classroom, thus reducing the number of teachers and actual classrooms required (salaries and building costs). This way of thinking is clearly an economic decision based on the class as a factory, not on the class as a family. Some educators respond to this control measure today the same way that educators responded one hundred years ago stating that they believe that the larger the class size the lower the achievement rate of the students.

#### Early Class-Size Research

Glass and Smith (1978) divide class-size research into four stages: the pre-experimental era (1895-1920); the primitive experimental era (1920-1940); the large-group technology era (1950-1970); and the individualization era (1970-present). The sophistication of the research methodology increased at each new stage. The question of class size and its effect on achievement was examined in each of these stages.

In the pre-experimental era (1895-1920), the first empirical study examining the class-size question and its effect on achievement was conducted by Rice in 1902. Rice reported no numbers in this study; but he stated that he found no strong relationship between class-size and achievement. A 1909 study by Cornman reviewed promotion records for a school district in Philadelphia. These classes were categorized into three groups: a) under 40 pupils, b) 40 to 49 pupils, and c) 50 or more pupils. Eighty-eight percent of 400 pupils were promoted in the under 40 category; 85% of 1,300 pupils were promoted in the 40-49 category; and 81% of 640 pupils were promoted in the classes over 50. There was little discussion of experimental control in this study (Glass and Smith, 1978).

Beginning in the primitive experimental era (1920-1940) better research methods were used to examine the class-size and achievement question. Researchers began using matched pupils in large and small classes; content and methods were standardized in the two comparison



classes; sometimes the same teachers taught classes of both sizes. In 1924, Tope, Groom, and Beeson began a study in Grand Junction, Colorado. This was a study of class size and achievement in high school grammar and English classes of 44, 34, and 20 pupils. The experiment ran for nine weeks. Testing results slightly favored the two smaller classes over the larger class of 44 students.

As America went to war in the 1940s, class-size research went dormant. In the 1950s and 1960s America was faced with swelling enrollments (particularly at the college level). If lecture class-size could be doubled or tripled without loss of effectiveness, costs could be cut. At this time, large empirical studies of education were conducted: the Coleman study of equality of educational opportunity (1966); Project TALENT; the International Assessment of Education in mathematics and reading; and surveys of government-funded programs of compensatory education (Title I). These large studies usually included data on the relationship of class size and achievement. Glass and Smith (1978) state that in the famous Coleman study, tens of thousands of pupils in grades 1, 3, 6, 9, and 12 were surveyed. The pupil/instructor ratio was correlated with pupil achievement. The correlations were generally negative.

In the individualization era (1970-present) the research related to class size was concerned with establishing the benefits of individualization. Experiments in these studies involved radically reduced instructional group sizes (1 teacher to 2-3 pupils). Bausell (1972) conducted a study in which pupils in grades 4 and 5 were assigned randomly to receive individual tutoring in arithmetic for one hour across two days of instruction by comparable teachers for the same amount of time in a class of 25 pupils. Test results showed that pupils in "class-size 1" scored approximately one-half standard deviation above pupils in classes of 25 students. These early class-size research studies set the stage for the present class-size debate.

#### The Current Debate

After the publication of A Nation At Risk in 1983, educational reform became a popular issue. The debate over class size and achievement took on a new importance. Some states began

proposing average class-size reductions as a means of improving student achievement.

Tomlinson (1988) quotes the National Education Association (NEA) urging its affiliates to seek an optimum class size of 15 students in NEA resolution 1986, first adopted in 1969. Tomlinson (1988) asks where did the NEA get their magical number of 15? He suggests that this number came from one of the first major class-size meta-analyses conducted in 1978 by Smith and Glass.

#### Current Class-Size Research

Glass and Smith (1978) and Glass, Cahen, Smith, and Filby (1982) reported a meta-analysis of the research on class size and student achievement in the late 1970s. The massive literature review of twentieth century research on class-size and student achievement netted a total of 725 effects from 77 different studies. Odden (1990) summarizes the conclusions from this first meta-analysis:

- a) Sixty percent of all 725 effects showed higher achievement in small classes. A clear and strong relationship between class size and student achievement was apparant.
- b) Students learned more in small classes.
- c) Class size needed to be reduced to at least 15 students to produce important impacts on student achievement.

Glass and Smith (1978) removed the studies that had neither acceptable experimental controls nor sound research designs. This process left 14 of the original 77 studies, with 109 effect measures. Odden (1990) summarized the results from the analysis of these 14 studies.

- a) A stronger relationship between class size and student achievement appeared.
- b) Achievement improved from the 50th to the 60th percentile when reduced to 15 students.
- c) Achievement improved about 1/2 standard deviation (from 50th to 70th percentile) when class size was reduced to 10 students.

The Smith and Glass (1978) meta-analysis was a major breakthrough by providing a way that decades of research on a particular process can be summarized for conclusions.

However, there are criticisms of this process. Odden (1990) addressed one problem with the class-size literature use of pupil-teacher ratio. In some studies, the term teacher meant any certified professional in the building (example, guidance counselor). In other studies the term teacher meant only class-room teachers. The difference in these numbers of teachers could have an effect on the pupil-teacher ratio used in many studies. Odden (1990) also explained the terms meta-analysis and effect size (ES) as used in the Glass and Smith (1978) and the Glass, McGraw, and Smith (1981) studies. "A meta-analysis generally takes the effect from each study and calculates the effect as a proportion of the standard deviation of the achievement measure used in the particular study. The effect size measure (ES) standardizes the impact of different achievement measures used in various studies so that an analysis of effect sizes can be carried out using many studies." For example, an achievement gain of 1/2 a standard deviation unit (effect size of 0.5) would reflect a rise in student performance from the 50th percentile to the 69th percentile. An impact of one standard deviation (effect size of 1.0) would mean a rise from the 50th to the 83rd percentile.

Slavin (1984) states that the meta-analysis process gives equal weight to all study findings, whether or not the studies are methodologically sound (note that only 14 of the 77 Glass and Smith studies in the original meta-analysis were sound studies). A second criticism is that meta-analysis can combine studies that are on different topics but that are under the same general topic (one of the Smith and Glass studies was on how to play tennis). A third criticism of meta-analysis is its reliance on statistical interpolations.

In 1989, Slavin used the Glass and Smith data and reanalyzed the results using only the methodologically sound studies addressing student academic achievement. Slavin summarized the effect findings without using statistical interpolations. He found that the data base used in the Glass and Smith study did not include a continuous range of small classes. A few classes had around 20 students, a few classes had around 15 students, and others were one-to-one or small-group tutoring. There were no classes between three and 14 students. Slavin (1989) stated that

the Glass and Smith (1978) results for classes of less than 20 students are based on statistical interpolations of the findings in the 14 methodologically sound studies. The effect size would be 0.10 standard deviation for the small classes with about 20 and about 15 students. Madden and Slavin (1987) conducted a study of tutoring programs for at-risk students. They found that classes need to be reduced dramatically (maximum of three students) to produce effects in the same range (above 0.5 to 1.0 standard deviations) as found by Glass and Smith. Odden (1990) supports this finding and states that it seems that the greater effect sizes of small classes in the Glass and Smith (1978) study were driven by small-group and one-to-one tutoring.

After the Glass and Smith meta-analysis was published, the Education Research Service (ERS) conducted a literature review of class size and student achievement research (1978). Robinson and Wittebols (1986) followed this analysis with a more detailed review. This study was organized by different areas such as level of schooling (grades K-3, 4-8, and 9-12), content areas, and type of student. The Robinson and Wittebols (1986) study netted several important findings for class-size research. The evidence was strongest showing that class-size reductions to 22 or fewer students improved student performance in grades K-3. The evidence of impact of class reduction to 22 was less strong for grades 4-8 and fairly nonexistent for grades 9-12. Since most of the studies measured reading and mathematics achievement, no firm conclusions were drawn regarding class size and impact on content areas. The impact of smaller classes was stronger for reading achievement than for mathematics achievement. They also concluded that almost all of the small number of studies that addressed the issue of type of student found higher achievement for low income and minority students in smaller classes.

There are two noteworthy longitudinal studies of reduced class size in elementary grades. The state of Indiana's project PRIME TIME reduced class size in grades K-3. The Indiana legislature appropriated funds to study the effects of reduced class-size when the program was implemented. McGiverin, Gilman, and Tillitski (1989) concluded from this study that children in small classes (average 1:19 students) performed better than students in large

classes (average 26.4 students). Over a two-year period, the effect was 0.34 standard deviation. It is important that this was a longitudinal study. Odden (1990) notes that often first-year achievement gains erode in the second year. A positive effect size was maintained in the second year of PRIME TIME. The effect size was 1/6 (0.17) of a standard deviation each year or about 1/3 of a standard deviation over the two years.

Tennessee's Student/Teacher Achievement Ratio (STAR) is a reduced class-size effort similar to Indiana's project PRIME TIME. Project STAR began in 1985 with pupils in kindergarten. All school districts in Tennessee were asked to participate. Forty-two out of 140 school districts were selected with 79 elementary schools in those districts voluntarily providing sites for the study. The study sites had to agree to participate for four years, to have visitations and some extra testing, and to allow random assignment of pupils and teachers to study conditions. Each school had to be large enough to accommodate three classes or the three study designs: a) (S) small class with average 1 teacher to 15 pupil ratio, b) (R) regular class with average 1 teacher to 24 pupil ratio, and c) (RA) regular class with average 1 teacher to 24 pupil ratio and on full-time assistant. This study design helped ameliorate variables such as individual school leadership, curriculum, facilities, expenditures, student SES, etc.. The STAR study only changed the class size; schools and districts operated as usual except for the class-size conditions. The major question in the STAR study was "What is the effect of reduced class size (e.g., 1:15) on pupil achievement and development in K-3?" (Nye, Achilles, Boyd-Zaharias, Fulton, and Wallenhorst, 1994, p.11). Researchers used scaled scores to study year-to-year gains as each pupil was in the same kind of condition (S, R, and RA) each year of the study.

Nye, et al., (1994) stated that the major achievement results of STAR are that students in (S) condition did statistically significantly better ( $p \leq .001$ ) than students in (R) and (RA) conditions. This class-size effect was found in all locations (i.e. urban, rural, suburban and inner city), and at all four grade levels. STAR results also show that over 17% more minority

students pass the basic skills test if they are in the (S) condition rather than in the (R) or (RA) conditions. The effect sizes favoring (S) in STAR range from .08 in (K) to .40 (in grade 3) for minority students. The positive STAR effect sizes for pupils in (S) are in the .20 to .27 range. The Lasting Benefits Study (LBS) results indicate that positive effects last up to five full years (as of 1994) from a student's involvement in a small-size class and then returning to a regular class.

The Lasting Benefits Study (LBS) was conducted in Tennessee to see how long the initial achievement gain would benefit students who had been in the (S) condition. Analyses of grade 4 testings of pupils who were back in the regular classes for a full year showed that pupils who had been in (S) were statistically significantly ahead of the other pupils (R, RA) in reading, math (the two areas tested in STAR) and other subjects. Researchers have been able to "track" about 4,500 pupils in grades 4, 5, 6, 7 and 8. In all grades, students from (S) outperform the other students (R and RA). The LBS research shows that the early benefits of (S) schooling persist, at about the same level, for at least five years after treatment (Nye, Boyd-Zaharias, Fulton, Achilles, & Pate-Bain, 1994).

Achievement and class size have been the major focus of class-size studies. A few researchers have begun to ask the why and how questions about student achievement in small classes. Why is achievement higher in small classes? What happens differently between teachers and students in small classes than occurs in regular-size classes?

Smaller classes tend to have a positive impact on teachers' classroom attitude and behavior. Shortly after their study of class size, Smith and Glass (1980) conducted a meta-analysis of research on class size and classroom practices. Strong relationships appeared between small classes and teacher attitudes, morale, and satisfaction, student attitudes and interests, and changed classroom practices. Teachers of small classes felt better, used individualized pedagogy, and experienced increased interactions with students.

Filby, Cahen, McCutcheon, and Kyle (1980) conducted a follow-through study of teacher behavior in these case studies. These authors drew the following conclusions about the relationship between small classes and teacher actions:

- a) Teachers could provide more in-depth lessons. They could move through the curriculum more quickly, and provide more curriculum enrichment activities. Therefore, students learned more.
- b) Classroom management functioned more smoothly, less time was spent on discipline, and student absences were proportionately lower.
- c) Students received more individualized attention, academically as well as encouragement, counseling, and monitoring.
- d) Students attended to their classwork. They experienced less wait time to have their papers checked. Students had more opportunities to participate in group lessons.

In 1986, Bourke conducted a study of 63 fifth-grade teachers of large and small classes. Achievement and class size and teacher behavior were studied over a school term in this study. Bourke drew the following conclusions:

- a) Whole group instruction was related to class size. In the smaller classes student achievement and whole-group instruction were higher. In larger classes, teachers tend to form small groups and students had lower achievement. Teachers repeated the same material several times in each group and thus lowered the overall instructional time for each individual student.
- b) More teacher time was spent answering questions about nonacademic procedures in larger classes, thus decreasing available instructional time.
- c) Teachers of small classes asked students more probing questions and provided more "wait time" for student answers. These two questioning behaviors are often linked to higher achievement. Since teachers spent less time managing small classes, more time was available to ask probing questions and to "wait" for student answers.

d) The number and length of homework assignments were combined into one variable in this study. The result was that students in small classes had more homework. Research on homework indicates that students in grades 5 and up who have more homework also generally have greater achievement gains.

### Summary

This review of selected literature has revealed that the issue of class-size and student achievement has received and is still receiving important attention. The literature reflects that achievement does increase with lower class sizes. The question for some educators remains does achievement increase enough to warrant the cost of lower class size.

The literature review reflects the importance placed on student achievement in the selected studies. A few studies are beginning to examine the teacher practices that help make small classes beneficial to students. Student achievement is important, but it may be possible to increase that achievement by implementing sound practices of small classroom teaching. More research into this area may answer that question being asked about how and why does higher achievement occur in small classes.



### CHAPTER III

#### CONTEXT, INFORMATION, METHODS, AND PROCEDURES

The primary purpose of this study was to observe and describe communication interactions between teachers and students in grade 1 small (1:15) classes. Much of previous small class-size literature discussed the results of small class size, based on an increase in student achievement (Word, et al., 1990). Little of this literature addressed "How?" and "Why?" students in small (1:15) classes experience achievement gains. This study dealt with the "How" and "Why" questions and attempted to describe what occurred in the small (1:15) classroom between grade 1 teachers and students. The study was conducted at two schools, school A with a 1:15 teacher/pupil ratio and school B with a 1:23 teacher/pupil ratio, in grade 1.

This descriptive research study combined quantitative and qualitative approaches. Quantitative research methods alone could yield the "What", or increased student achievement on test scores. Qualitative research methods allow a description of "Why" and "How" student achievement increased. Teacher participants in the study were asked to complete a Student Grouping Questionnaire, a Parent Volunteer Interaction Questionnaire, and the Teacher Problem Inventory (Cruickshank, 1960). The researcher conducted classroom observations using the PIT (Personal, Institutional, and Task) model (French & Galloway nd.) in kindergarten, grade 1, and grade 2 classrooms in the focus and comparison schools. The California Achievement Test (CAT) (normally used in the participating school system only to monitor Chapter 1 students) was administered by the school system to all of the first graders in school A and in school B as a pretest and posttest measure of reading and math achievement. The researcher conducted classroom observations using the PIT model to gain an insight into communication interactions between grade 1 teachers and pupils. As a follow-up, interviews

using the Teacher Exit Interview questions adapted from the Tennessee Project STAR were conducted with grade 1 teachers at school A (1:15), and brief reflective narratives written by these teachers (school A, grade 1) were submitted for content analysis. See Figure 1 for study diagram.

### Context of the Study

#### Schools

This study was conducted at two schools in Guilford County, North Carolina, school A in High Point, North Carolina, and school B in Greensboro, North Carolina. Both schools were K-5 with approximately 380 student enrollment. School A had 78% free lunch students and was a fully-funded Chapter 1 school (1993-94) school B had 74% free lunch students and just received fully-funded Chapter 1 school status at the end of the study (1994-95). Both schools had comparable socio-economic status (SES), with race breakdowns of approximately 47% white and 53% nonwhite students. Both schools were primarily "neighborhood" schools that were in the same school system for the first time. The 1993-94 school year was the first year of merger for the Guilford County School System; previously the schools were in separate urban systems, Greensboro and High Point.

#### Organization

The schools selected for this study were comparable in many ways, with the major difference being their organization for instruction. After observing the needs of children at school A, the faculty and staff determined to try to adjust the school to respond to student problems. As the school became fully Chapter 1 eligible, those funds were deployed to provide class sizes in the early primary to allow teachers to work individually with students. Building upon teacher problem diagnosis and research results from class-size studies (Bain et al., 1993; Cahen et al., 1983; Finn & Achilles, 1990; Robinson, 1990; Slavin et al., 1990) and information about quality pre-school (e. g. Weikart, 1989) the faculty and administration chose to use

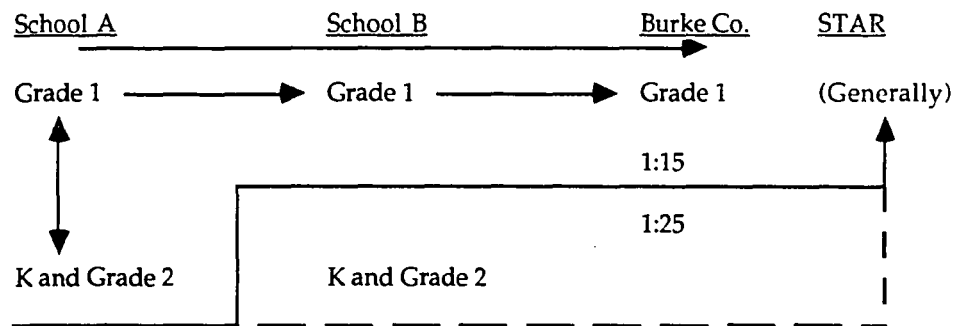


Figure 1. Diagram of study. Direct study emphasis and comparisons are inside solid lines.

Chapter 1 and other resources to reduce class sizes in K-2 to about 1:15 teacher-pupil ratio beginning in 1992-93.

School B was organized with regular class size (1:23) in most grades, particularly in grade 1, the focus of this study. These grade 1 classrooms each had a full-time teacher assistant and the usual extra or pull-out Chapter 1 programs.

Each school had its own configuration of support personnel and special programs to assist in the education process. Both schools had Chapter 1 teachers, parent and volunteer programs, etc. School B had a program where local members of the Bar Association (lawyers) provided one reading session per week as a tutorial with some pupils, and a Reading Discovery teacher was assigned to offer extra reading (tutorial) help to students in the lowest reading quartile. Both schools had consistently ranked low in comparisons with other schools in the system on pupil test results. This ranking is probably at least partly a function of students entering school not as well prepared for the requirements of schooling as are pupils in other schools. Faculties in both schools worked creatively with pupils to get the best results possible.

#### Issues of Space

Interactions between pupils and teachers and among pupils are influenced by the environment and space in which the interactions occur. Neither school A nor school B was new; but there were major differences in classroom space. Thus, the researcher noted the space and space usage in both schools. School A had an open feeling. The classrooms were approximately 31 X 31 feet (961 square feet). Several classrooms adjoin, so that there could be mobility between rooms. The classroom also allowed space for learning centers and small and large group activity.

School B classrooms projected a feeling of more confined space. These classrooms were 23 X 23 (approximately 530 square feet). Learning centers were crowded into corners; student desks were crowded together in order to provide some space for small and large group activity.

Both grade 1 classrooms were located next to each other, but no door provided mobility directly between the two rooms.

There was a physical difference in classroom size of 432 square feet ( $961-529=432$ ). School A (1:15) had an average of 64 square feet per pupil. School B (1:23) had an average of 23 square feet per pupil. One would expect a difference in classroom atmospheres because at school A fewer children are occupying more space, and at school B, more children are occupying less space.

#### Design of the Study

This descriptive study was based on a quasi-experimental design (Campbell & Stanley, 1963). Elements of design #10 (nonequivalent control group) and design #8 (the equivalent time-samples design) are incorporated into the study. Campbell and Stanley (1963) note the non-equivalent control group design as one of the most widespread quasi-experimental designs in educational research. Both the experimental and control group are given a pretest and a posttest. The control group and the experimental group do not have (or may not have) pre-experimental sampling equivalence. The groups (students assigned to classrooms) represent naturally assembled collectives. Most teachers begin the year with approximately the same number of students per class within the same school.

The communication events of teachers at both school A and school B were sampled using the PIT instrument at least two times during the school year. Campbell and Stanley (1963) define this equivalent time-sample design as a form of experimental design that employs an equivalent sample of persons (and/or of events) to provide a baseline against which to compare the effects of the experimental variable(s) such as class-size and in-service opportunities.

The qualitative aspect of the study was addressed by the use of the one-shot case study method. Campbell and Stanley (1963) question the "scientific" effectiveness of studying a single instance. They state that this type of study would be more valuable if the study of a comparison group were introduced. This present study incorporated comparisons between

regular class size (1:23) at school B and small class size (1:15) classroom observations at school A. Additionally, although the focus was grade 1, communication event observations were made in grades K and 2 to provide context data. Finally, there were comparisons between schools A and B and the general results obtained in Project STAR (Word et al., 1990).

Schofield and Anderson (1984) describe qualitative inquiry as:

(a) conducted in natural settings, such as schools or neighborhoods; (b) utilizes the researcher as the chief "instrument" in both data-gathering and analysis, (c) emphasizes "thick description," that is obtaining "real," "rich," "deep," data which illuminate everyday patterns of action and meaning from the perspective of those being studied, (d) tends to focus on social processes rather than primarily or exclusively on outcomes, (e) employs multiple data-gathering methods, especially participant-observation and interviews, and (f) uses an inductive approach to data analysis, extracting its concepts from the mass of particular detail which constitutes the data base. . . . (p. 21)

This study incorporated several of the qualitative elements described by Schofield and Anderson. The study was conducted in two schools, with the researcher as the chief instrument for data-gathering and analysis. The focus of this study was primarily the process of how or why students in small-size classes experienced increased achievement, not just the increased quantitative achievement outcomes that were validated in STAR and in the 1:15 classes in school A of the present study. This study employed multiple data-gathering methods such as participant observation (observation of teacher-student communication events), interviews, questionnaires, and student tests. All of these data-gathering methods aided in the descriptive analyses of this study and helped the researcher formulate conclusions regarding the problem - the lack of literature describing what happens between teachers and students in small classes (1:15).

### Subjects

This study included two levels of subjects at both schools A and B. The major focus was grade 1 teachers in both schools (n=7), and the grade 1 students at both schools (n= 7 classes ). A secondary focus was grades K and 2 teachers and pupils at both schools. Four grade 1 teachers were observed and interviewed at school A (1:15). (See Table 1.) Two grade 1 and one teacher with a split grade (kindergarten/grade 1) were observed and interviewed at school B (1:23). All teachers at both schools remained in the study throughout the 1993-94 school year. While grade 1 classrooms were the major focus of this study, kindergarten and grade 2 classrooms were observed in both school A and school B to give researchers added information to help them understand more about the context and total early primary experience.

At school A, three of the four first-grade teachers were second-year teachers. One teacher was a third-year teacher. Three teachers held bachelors degrees, and one teacher held a masters degree. All four teachers were white. These teachers only had experience in teaching small (1:15) classes.

At school B, the three first-grade teachers had varying years of experience: 15 years, 3 years, and 21 years. Two of the three teachers held bachelor's degrees, and one teacher held two bachelor's degrees and one master's degree. Two of these teachers were white, and one was African-American. In contrast to school A first-grade teachers, these teachers only had experience in teaching regular (1:23) classes. Table 1 summarizes this teacher information.

### Instruments

Four types of data collection instruments were used in this study: questionnaires, the PIT model to collect teacher observations, the California Achievement Test (CAT), and teacher interviews.

#### Student Grouping Questionnaire

The Student Grouping Questionnaire consisted of six questions (See Appendix B for a copy). Questions 1 through 4 asked if students were divided into small groups on a regular basis

Table 1

Grade 1 Teacher Information for the Two Schools in this Study (1993-1994)

<u>Teacher</u>	<u>Race</u>	<u>Sex</u>	<u>Degree</u>	<u>#Pupils</u>	<u>Experience</u>
<u>School A</u>					
1	W	F	BA	14	3
2	W	F	MA	15	2
3	W	F	BA	15	2
4	W	F	BA	14	2
<u>School B</u>					
1	W	F	BA	23	15
2	B	F	BA	24	3
3*	W	F	BA, MA, BA	10/10	21

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\*Split class K/1.



for each of the following subjects: reading, mathematics, science, and social studies. The number of small groups and average number of minutes per week for each subject area were recorded if teachers used small groups. Question five asked how students were assigned to reading or math instructional groups: a) by skill level, b) by the child's interest, and c) other procedures. Method of assignment was indicated by a "1" for yes and a "2" for no under the two subject areas. Question six asked if children were moved from one math or reading group to another during the school year. Answers were: 1=yes; Frequently (every six weeks or more often,) 2=yes; Occasionally (less than every six weeks, but at least once during the year), and 3=no.

#### Parent/Volunteer Interaction Questionnaire

The Parent/Volunteer Questionnaire consisted of 16 questions. Questions 1 through 8 asked how many times in the past four weeks a teacher has made contact (telephone, note, conference, home visit, form letter, newsletter, parent volunteered in classroom) with parents. Question 9 asked for the number of professional visits made to student homes for the entire year. Question 10 asked if teachers were satisfied with the quality and quantity of parent interactions. Question 11 referred to Question 10, asking what would have to occur for the teacher to be satisfied with the teacher/parent interactions. Question 12 and 13 asked for the number of times parents had volunteered in the classroom in the areas of a) clerical assistance, b) instructional assistance, and c) leading the entire group lesson. Questions 14 and 15 gathered information about how often a teacher assistant monitored or supervised children, assisted in preparing materials and clerical duties, and assisted in instruction. Question 16 asked how many times a speciality teacher taught the class. See Appendix C for Parent/Volunteer Questionnaire.

#### Teacher Problem Checklist

The Teacher Problem Checklist (Cruickshank et al., 1980) is a 61 item checklist designed to ask teachers about five problem areas: time issues, pupil control, parent relations,

students success, and affiliation on two dimensions: a) how frequently is this a problem? and b) when it does happen, how bothersome is it? See Appendix D for a copy of the Teacher Problem Checklist (TPC).

#### PIT Observation Model

The PIT is an acronym derived from the beginning letters of the types of communication events it is designed to detect, Personal, Institutional, and Task (i. e., three of the four categories of communication events originally defined by French and Galloway, 1968). The PIT model was developed as a means of quantifying teacher/pupil communication interactions, without dividing these into large numbers of categories. In this study, the observers' attention focused on the actions and reactions of the teacher, with a secondary focus on pupils. A Personal (P) communication event is when the personal goals, needs, and emotions of pupils and/or teachers are the central focus. The following are examples of personal events:

- 1) Pupil expressions of frustration and teacher response to these expressions.
- 2) Teacher expression of personal interest in or concern for a pupil or his problem.
- 3) Pupil expression of affection toward the teacher and teacher response, either verbal or nonverbal.
- 4) Angry dialogue between two pupils concerning actions on the playground (French & Galloway, p.550).

An institutional event focuses on classroom management and/or meeting the expectations of the educational institution. The following are examples of institutional events:

- 1) A verbal and/or nonverbal reprimand to a student for chewing gum. The reprimand stems from a school rule against it.
- 2) Teacher handing back quiz papers and explaining grading procedures.
- 3) Teacher calling roll and pupils responding verbally or nonverbally.
- 4) Pupils and teacher preparing for the viewing of a motion picture.
- 5) Teacher announcement and/or explanation of school events or activities.

- 6) Teacher calling for, signing, and discussing with pupils their absence excuses.
- 7) Teacher cueing pupils verbally and/or nonverbally in an attempt to maintain silence or order and pupils responding to the cues.
- 8) Teacher directing pupils to begin their homework; pupils feigning industrious activity.
- 9) Teacher verbal and/or nonverbal direction to pupils in how to leave the classroom for some particular purpose (French & Galloway, p. 549).

Task events (T) focus on the teaching and learning of subject content whether cognitive, affective, or skill oriented. The following are examples of task events:

- 1) A teacher/pupil discussion of the functions of Congress.
- 2) A teacher demonstration of how to read a weather map.
- 3) Teacher explanation of the factors influencing the Battle of Gettysburg while pupils take notes.
- 4) Teacher aiding individual pupils during an independent study period.
- 5) A student report on inflation.
- 6) A laboratory exercise in which pupils with the aid of the teacher are using microscopes (French & Galloway, pp. 549-550).

In summary, Personal events (P) consist of activities not directly associated with school. Personal events can be teacher or student expressions of values or emotions. Institutional events (I) are sometimes referred to as "playing school" activities. Institutional events are the mechanics that help the school day to run smoothly. Task events (T) are instructional events that have to do with teaching and learning the subject matter.

All communication events (Personal, Institutional, and Task) are individual or group oriented. An individual event includes the interaction between the teacher and only one student. A group event involves the teacher and two or more students. An individual Task event would be coded Ti. A group Task event would be coded Tg. The fourth category for

communication events is called Mixed events (M). If two or more communication events become confounded, this combination is called a Mixed event and an M is coded. The PIT model requires the observer to decide if an event is personal, institutional, or task. The event is coded mixed if it contains elements of two of these or of all three events. An individual mixed event is coded Mi, and a group mixed event is coded Mg (Crist, 1975).

### Teacher Exit Interviews

The teacher interview questions were modeled from the teacher exit interview questions used in Project STAR (Word, et al., 1990). Questions were grouped into the 14 major categories identified in the STAR exit interview data: A. Grouping; B. Physical Environment; C. Learning Centers; D. Social Climate; E. Enrichment Activities; F. Classroom Management and Discipline; G. Monitoring and Evaluating Pupil Progress; H. Morale and Attitude Toward Work as a Teacher; I. Amount or Rate of Student Progress; J. Parent/Teacher Relationships; K. Teacher Aides; L. Instruction; M. Teacher Planning and Preparation; N. Individual Attention to Students; O. Other Comments. Teachers were asked if there were differences in these areas as compared to last year; how was it different; and why did they think it was different. See Appendix E for a copy of the Teacher Exit Interview (TEI).

### Burke County Narrative Questionnaire

Burke County narrative questionnaires asked teachers to list responses in four areas: 1) benefits of small classes (1:15), 2) problems associated with small classes (1:15), 3) major differences between teaching in small (1:15) classes and teaching in regular (1:23) classes [if the teacher had regular class-size teaching experience], and 4) other comments. The number of years of teaching experience was optional background data. See Appendix F for a copy of the Burke County Narrative Questionnaire.

### Coding of the Data

To code communication events using the PIT model, the appropriate letter designating the event being observed is placed on a coding sheet at the beginning of the event. Dots (. . .)

are placed below the event letter at approximately four to six second intervals for the duration of the event. A communication event continues as long as the focus or contact between the involved parties is not interrupted. A change in the designated letter signals the beginning of a new event. A group task event with a duration of about 25 seconds followed by an individual institutional event would be coded as Tg . . . li. The li marks the initiation of a new event. See Appendix G for a copy of a sample coding sheet.

#### Procedures and Time Frames for Collecting Data

Researchers visited each school several times: observing, taking notes, interviewing (formal and informal) reviewing performance records, and collecting and analyzing teacher and pupil interactions and communication patterns using the PIT observation process.

In November, 1993 meetings were held with kindergarten, first and second-grade teachers at school A. In December, 1993 a meeting was held with kindergarten, first, and second-grade teachers at School B. At these meetings, the informed consent forms were discussed and completed by the teachers, and the teacher assistants, if needed. See Appendix H for a copy of the Informed Consent Form.

The purposes of the Study and data gathering procedures were discussed. Teachers were reassured that they would not be evaluated. Teachers were provided with a sample PIT coding sheet.

In December, 1993, the first sets of "pre" data observations using the PIT model were conducted at school A. Observations were made on two consecutive days by two observers. In January, 1994, the second sets of "pre" observations using the PIT model were conducted at school A on two consecutive days by two observers. During the first and second rounds of observations, kindergarten, first, and second-grade classes were observed and coded at least one time with observation durations between 15 - 40 minutes. Teachers at school A completed the teacher questionnaires in January, 1994.

In February, 1994, the first sets of "pre" observations using the PIT model were conducted at comparison school B. Three researchers conducted these observations. The observations occurred on two consecutive days, with observation durations ranging from 10 - 25 minutes. One kindergarten, one kindergarten/first grade, two first-grade classes and two second grades classes were observed.

The two first-grade classes at school B were observed once by two observers in March. These same first-grade classes were observed once in May by only one observer. Observations ranged in duration from 10 -20 minutes. Teachers at comparison school B completed the three teacher questionnaires in February, 1994.

In May, 1994, the "post" observations using the PIT model were conducted at school A. Observations were made within a two-week time period on two consecutive days in the first week and on one day in the second week. These observations were conducted by one observer. Each kindergarten and second-grade class was observed one time. First-grade classes were observed two times. Observation durations averaged about 20 minutes each.

Teacher interviews using exit interview questions from Project STAR were conducted with school A first-grade teachers in May, 1994. These teachers also wrote brief personal narratives about their teaching and teaching philosophies during a staff development activity. These narratives were submitted for content analysis. See Table 2 for timeline.

#### Rater Agreements

Three investigators collaborated in collecting data for this study. The doctoral study was completed in conjunction with the author's assistance on the "Success Starts Small" or SSS study funded by the Small-Grants School-Based Research Program of North Carolina. "Success Starts Small" was conducted by a professor at the University of North Carolina at Greensboro, who was the principal investigator (PI). A full-time graduate student at the University of North Carolina at Greensboro served as research assistant and data collector. The author of this dissertation was the primary data collector and research associate on the "SSS"

Table 2

Time Line for Data Collection in This Study

<u>Events</u>	<u>School A</u>	<u>School B</u>	<u>Burke Co.</u>
Met with Teachers	Nov., 1993	Dec., 1993	
Pilot Test	Dec., 1993		
PIT Classroom Pre- Observations	Dec., 1993 Jan., 1994	Feb., 1994 Mar., 1994	
PIT Classroom Post- Observations	May, 1994	May, 1994	
Parent/Volunteer, Grouping & Teacher Problem Questionnaires	Jan., 1994	Feb., 1994	
Teacher Exit Interviews, Narratives	May, 1994	May, 1994	May, 1994
Grade 1 Students Pretested with CAT	Dec., 1993	Dec., 1993	
Grade 1 Students Post- tested with CAT	Mar., 1994	Mar., 1994	
Data Analyses	June, 1994	June, 1994	
Write-Up	Aug.-Dec., 1994		

investigation team. The professor provided expertise in using the PIT Observational Model and had wide class-size research experience. The full-time graduate student had five years teaching experience in grades K-1, and the dissertation author had ten years teaching experience in grades K-1.

To assure consistency in observations between and among raters, the investigators studied the instructions for use of the PIT (French & Galloway, nd; see Appendix A). The (PI) had experience in using the PIT in prior research and in working with French, one designer of the PIT. Several pilot tests were conducted to hone observational skills and to make adjustments in a form to collect the data. A preliminary report based on early observations and the pilot test was prepared and presented at the 1993 Southern Association of Colleges and Schools (SACS) meeting in Atlanta, Georgia (12/93) (Achilles, Kiser-Kling, & Owen, 1993). The pilot test conducted in early December, 1993 at school A was used to familiarize the students and teachers with the observation process and to assure some rater agreements.

All classroom observations were made by the three persons on the research team, usually in teams of two persons per observation. Researchers discussed their results after each observation session when two or more researchers were present. This discussion allowed for the team to arrive at agreement for the observation if there was any deviation in coding. The following procedure was used to provide a computation for the percent of agreement. The PI was identified as "expert" based upon his prior work in classroom observation studies ( e.g., Achilles & French, 1977). Each of the other two investigators compared her ratings with the "Expert" over the same time frame of a classroom observation. This model was:

RATER A  $\longleftrightarrow$  EXPERT RATER  $\longleftrightarrow$  RATER B

A simple percent of agreement was computed between Expert and Rater A, and between Expert and Rater B. At least 80% agreement was acceptable for the research purposes of this study.

Percents of agreement were based on several components of the PIT:

- a ) TOTAL communication events, including duration;



- b) changes or shifts in events [e. g., from (P) to (T)];
- c) direction of event (Individual or Group);
- d) tallies of the type of event [(P), (I), (T), or Mixed].

Two separate observations were used of different first-grade classes. The total of both teachers provided the basis for the tabulation of agreements between Rater A and the Expert Rater. One set of observations provided the basis for percents of agreements between Rater B and the Expert. Tabulations appear in Appendix I based on a computation of percent of agreements using the larger number as the dividend:  $\text{Expert} + \text{Rater}$  or  $\text{Rater} + \text{Expert}$  or  $\text{Rater} + \text{Rater} = \% \text{ Agreement}$ .

Most percents of agreements between Expert and Rater A and Rater B were between 93% and 100%. The greatest differences were between the totals (duration), which results from slightly different perceptions of the 4-5 second interval for entering a record of an observation. There were essentially no disagreements on the changes in events, the direction (individual or group) or in the tallies of types of events. This high rate of rater agreement was a function of the simplicity of the PIT (a low inference instrument) and that the raters often worked as a team following the observation with discussion to reach a team result. Rater A's (the author) data collection was used whenever possible. Data of rater B were used whenever rater B and the Expert coded the same events. Data of the Expert were used only when the Expert observed classes without the other observers.

#### Data Analysis

Various formal and informal data collection processes were used in this study. Observational data collected by using the PIT were checked for inter-rater agreements and reported as percents. The durations of observations were not planned to be of equal time. There were not equal numbers of communication events for various groups. Raw data (n) were converted to percents (%) for all comparisons. A worksheet showing the data is in Appendix J. Data were grouped into the main categories of the observation instrument (T) or Task, (I) or

Institutional, (P) or Personal and (M) or Mixed. Few (P) and (M) events were recorded. Data were aggregated into Individual (i) or Group (g). All (P) events were (i) and all (M) events were (g).

The context data were collected early to establish the comparability of school A and school B. Data were reviewed again in May, 1994 to establish any changes that may have occurred during the project. Notes recorded by observers on the PIT data-collection form and the informal, but informed, professional judgments (IPJ factor) of the researchers constitute a source of subjective and informed information about the teaching and school aspects of this study.

Teachers at school A and school B completed the Teacher Problem Checklist (TPC) once. These data were "scored" and analyzed by grade and school. The TPC results were compared to results obtained in Tennessee's Project STAR (Word et al., 1990). The Grouping and Parental Involvement Questionnaires were adapted from Tennessee's Project STAR (Word et al., 1990). These results were tabulated. The open-ended responses were subjected to categorization by content analysis.

Standardized test data were obtained from grade 1 pupils in both schools. Grade 1 pupils were tested twice on the California Achievement Test (CAT). The pretest was administered on December 10, 1994; the posttest was administered March 29, 1994. The CAT II, Form E was used for both testings. Data were reported in Grade Equivalents (GE), Scale Scores, (SS), National Percentile (NP), and Normal Curve Equivalents (NCEs). The short time between pre and post testings and the late time (December) for the pretest may have hidden some results; but both groups (A and B) were affected equally.

Participants provided other data via interviews and questionnaires using the same exit interview questions used in the Tennessee's Star Project (Word et. al., 1990). Data were categorized by content analysis, and results were compared, as appropriate, between schools and/or with other sites (e.g., Project STAR, TN, or Burke County, NC).

Chapter IV. presents the analysis of data collected using the context, information, methods, and procedures discussed in this chapter.

#### Relationship of Present Study and Success Starts Small (SSS)

The present study was part of a funded project where the author was research associate with major responsibilities in data gathering, literature search, and reporting. The Final Report for SSS was submitted earlier (Achilles, Kiser-Kling, Owen, & Aust, 1994).

Some data are identical for both studies. Those data tables from the final report are incorporated here with little or no modification, as are appendices of instruments, questionnaires, and forms (Tables 3-18 that were edited and moved to the body of the text, and Figures 2 and 3). Analysis and discussion of data has been extended.

The present study extends the SSS report in significant ways in more recent data, in use of qualitative information, in analyses of questionnaire responses, in interview data, in use of the Burke County comparisons, and in interpretations.

## CHAPTER IV

### PRESENTATION AND ANALYSIS OF DATA

#### Summary of Method

The purpose of this study was to identify and describe how teachers teach in small (approximately 1:14) primary classes and specifically in first-grade classrooms. Communication event observations were conducted in kindergarten, first-grade, and second-grade classrooms at school A (with approximately 1:14 ratio) and in school B (with approximately 1:23 ratio). Observations were coded following the PIT analysis system. In using the PIT System, the observer classifies classroom interactions according to their functions. Classroom activities are observed as communication events. These events are classified as (P) Personal, (I) Institutional, (T) Task, and (M) or Mixed, the major categories of communication events. The PIT data were collected from in-class observations. Observation data were collected in December, 1993, and in January, February, March, and May, of 1994.

#### Results of Pilot Study

Consistency in observations between and among raters is required for validity in observational research. The researchers<sup>1</sup> conducted several pilot tests to refine the data gathering process and to make adjustments in the data collection form. During the pilot tests and throughout observation sessions where more than one observer was present, observers discussed the observations and their interpretations of those observations. In the pilot study, 76% of teacher/pupil communications in small (1:15) classes in K-2 were Task, and 53% of the (T) events were to individuals; 20% of communications were Institutional with 72% of the (I)

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<sup>1</sup>The term researchers refers to the research team in the Success Starts Small project of which the dissertation author was a member (Achilles, Kiser-Kling, Owen, & Aust, 1994).

events to groups. Most Personal communications occurred in kindergarten and all were individual; fewer than 5% of all communications were (P).

#### Data Sources

Several data collection processes were used in this study. Teachers at schools A and B completed the following questionnaires: a) Teacher Grouping Questionnaire, b) Parent Contact Questionnaire, and the c) Teacher Problem Checklist. Teachers at school A completed interview questions used in the Project STAR exit interviews (Word et al., 1990). Grade 1 teachers at school A completed personal narratives regarding their teaching. All grade 1, several grade 2, and several K teachers at school A and several grade 2 and K teachers at school B submitted brief narrative comments about the differences between the small size-classes (1:14) and regular size-classes (1:23). Burke County small class-size teachers completed a narrative questionnaire. School A principal submitted information from small class (1:14) teachers who taught regular-size classes (1:25) in 1994-1995.

#### Observational Data (PIT)

The durations of classroom observations were not planned to be of equal time, nor were there equal numbers of communication events for the various groups. To accommodate these two conditions, raw data (n) were converted to percents (%) for all comparisons. Observation data were grouped into the main categories of the observation instrument (T) or Task, (I) or Institutional, (P) or Personal and (M) or Mixed. Very few (P) and (M) events were recorded. Communication event data were aggregated into individual (i) or group (g) categories. An individual (i) event is when the teacher is communicating to just one student; a group communication event (g) is when the teacher is communicating to more than one student.

#### Context Data

The context data were collected early in the study to establish the comparability of schools A and B and again at the end of May, 1994 to note any changes that may have occurred during the course of the study. Notes recorded during the observations on the PIT data

collection form and informal, but informed professional judgments (IPJ factor) of the researchers provide a source of subjective and informed information about the teaching and school aspects of the study. The researcher has a total of 10 years teaching experience in grades K and 1. The assistant researcher had a total of five years teaching experience in grades K and 1.

#### Teacher Problems Checklist (TPC)

Teachers (n=22) completed the TPC once. Data were analyzed by grade and school. The TPC results were compared to results obtained in Tennessee's Project STAR (Word et al., 1990).

#### Grouping and Parental Involvement Questionnaires

These questionnaires were adapted from Tennessee's Project STAR (Word et al., 1990). Questionnaire results were tabulated. Open-ended responses were categorized by content analysis.

#### Standardized or Norm-Referenced Tests (NRT)

Grade 1 pupils in both schools were tested twice on the California Achievement Test (CAT). Both testings used the CAT II, Form E. The pretest was administered on December 10, 1993; the posttest was administered on March 29, 1994. Test data analyzed using Scale Scores (SS) and Normal Curve Equivalents (NCE).

#### Other Interview/ Personal Narrative Data

Teacher participants at school A completed a set of exit interview questions adapted from the Tennessee Project STAR. Results were categorized via content analysis and compared, as appropriate, to results obtained in Project STAR. First-grade teachers at school A completed reflective personal narratives as a part of a staff development activity. These narratives (n=4) were categorized via content analysis. In the 1994-1995 school year, the principal of school A interviewed the first-grade teachers (n=4) concerning the differences observed in their teaching situations. In the 1993-1994 and prior school years, these teachers had a small-size class (1:15); in the 1994-1995 school year, these teachers had a regular-size class (1:25). These interview

data were submitted to the researcher for this study. Grades 1, 2, and 3 Burke County small (1:15) class teachers completed a four-question narrative questionnaire. These responses (n=114) were categorized via content analysis and compared to school A and Project STAR data. See Appendix F for copy of questionnaire.

### Data Analyses

#### Parent/Volunteer Contact

Teachers in school A (grades K, 1, 2,) in school B (grade 1) and in Burke County (grade 1, n=9) responded to the Teacher/Parent Contact or Volunteer or Aide Work Questionnaire. Table 3 presents the results of these data. The Parent/Volunteer Contact Questionnaire asked teachers to respond based on the four weeks of school preceeding the date that the questionnaire was distributed. All teachers involved received the questionnaire within the same week. Data were collected following a standard format. Some teachers wrote notes that they had done many of the things that the items mentioned, but not within the last four weeks. For example some had made home visits at the beginning of the school year, but not within the time frame for the data collection.

Kindergarten classes in school A and grade 1 classes in school B had full-time classroom assistants. In grade 1 (school A and in Burke Co.) and grade 2 (school A) teacher assistants were part time. Teacher assistants were shared in the low-teacher-pupil ratio (1:15) classes (school A and Burke County). These assistants assisted mostly with clerical duties and supervision of lunch and small groups. The amount of help from a teacher assistant was a function of full-time vs part-time availability, not of class size. Teachers of kindergarten classes at school A and grade 1 classes at school B indicated the most help from assistants, and each of these groups had full-time assistants.

Teacher Assistant Use

School/Grade	Class Size	<u>Full Time</u>		Shared Use
		Yes	No	
School A (K)	1:15	X		
School A (1)	1:15		X	X
School A (2)	1:15		X	X
School A (3)	1:15		X	X
School B (1)	1:23	X		
Burke Co. (1)	1:15		X	X

Some type of written communication (written note, form letter, or newsletter) is the most popular communication between the school and home, whether the teacher has regular (1:23) or small (1:14) class-size. Some teachers in 1:14 sent at least one letter per pupil home per week.

A major difference for the small class (1:15) was in the area of home visits. Grade 1 teachers in school A and in Burke County registered considerably more average home visits per teacher than school B regular-size teachers. (See Table 3, question #9 Total home visits for the year.)

Pupil Grouping

Teachers in school A (grades K, 1, 2) and in school B (grade 1) and in Burke County (grade 1, n=9) responded to the teacher grouping questionnaire. These results appear in Tables 4-8. Teachers indicated yes or no if they grouped students for reading, math, science, and social studies; if yes, they indicated the number of groups used and the average minutes of grouping per week. In K there is very little formal grouping. Instruction is individual and whole group, with a major focus on reading readiness and developmental activity.



Table 3. Response, Using Last Four Weeks as Reference, of Number (n) of Teacher/Parent Contact, or Volunteer or Aide Work in the Classroom.  
(Full questionnaire in Appendix C. Numbers are rounded.)

Items/Stem (4 weeks)	SCHOOL A													
	Grade 1					Grade 2					Grade 3			
	A*	B	C	D	X**	A	B	C	D	X	A	B	C	X
1. Phone	7	5	3	8	5.8	27	20	3	6	14	3	0	6	4.5
2. Written Note	20	3	20	11.5	63	25	8	16	28	4	4	6	4.7	
3. School Conf.	0	0	0	1	3	12	6	1	2	5.3	1	0	1	7
4. Unsched. Contact	9	3	15	12	9.8	15	15	1	3	8.5	3	3	12	6
5. Home Visit	3	0	0	1	1	0	0	0	0	0	0	0	1	3
6. Form Letter	2	56	0	4	15.5	4	25	2	0	7.8	4	4	4	4
7. Newsltr	1	2	2	4	2.3	4	4	1	8	4.3	4	4	4	4
8. Parent Help	2	0	2	2	1.5	20	0	0	1	5.3	0	0	1	3
9. Tot. Home	16	0	0	9	6.3	2	0	0	0	5	0	0	1	3
10. Y,N	Y	Y	Y	N	Y	Y	N	N	N	N	Y	N	Y	Y
11.														
12. Vist	2	0	2	0	1	20	20	0	0	10	0	0	2	7
13. Volunt.														
A. Clerical	0	0	0	0	0	20	20	0	0	10	0	0	0	0
B. Instr.	--	0	0	0	0	20	20	0	0	10	0	0	1	3
C. Group Lesson	--	0	0	0	0	0	0	0	0	0	0	0	1	3
14. Aide Help	20	--	5	0	6.3	20	20	20	20	20	20	20	20	20
15. Aide do:														
A. Pupil Supv.	20	40	20	20	25	20	20	20	20	20	20	20	20	20
B. Clerical	20	20	7	10	14.3	20	20	5	20	16.3	20	20	20	20
C. Instr.	0	0	0	0	0	10	15	12	3	10	20	20	20	20
16. Spec. Tch.17 (subj)	18	15	13	15.8	9	6	5	13	8.3	7	7	6	7	
Aide?	P	P	P	P	P	P	P	P	P	P	F	F	F	F
Full (F)														
Part (P)														

\*A,B,C,D designate individual teacher data for each grade.

\*\*x=avg.

Table 3 continued.

<u>Items/Stem</u> (4 weeks)	<u>School B</u> <u>Grade 1</u>			<u>Burke County</u> <u>Grade 1 (One School)</u>									
	<u>A</u>	<u>B</u>	<u>X</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>	<u>I</u>	<u>X</u>
1. Phone	12	10	11	2	0	1	2	0	3	0	1	3	2.8
2. Written Note	15	20	17.5	20	1	1	3	30	32	3	15+	16	13.4
3. School Conf.	6	0	3	0	0	0	0	1	4	1	15	2	2.6
4. Unshed.	6	0	3	0	0	0	0	1	4	1	15	2	2.6
5. Contact	5	5	5	5	8	4	5	5	10	2	15	3	6.3
6. Home Visit	0	0	0	0	0	0	0	0	0	0	0	0	0
7. Form Letter	4	20	12	0	4	10	4	64	68	0	15	16	20.1
8. Newsltr	4	20	12	4	4	4	1	64	68	1	30	16	21.3
9. Parent Help	1	1	1	0	0	0	2	0	0	0	0	0	2
10. Tot. Home	0	0	0	16	18	17	17	16	17	20	30	16	18.6
11. Y,N	N	Y	?	N	Y	Y	Y	Y	Y	N	Y	Y	Y
12. Vist	00	20	10	1	8	4	8	18	4	4	2	5	6
13. Volunt.													
A. Clerical	0	0	0	16	18	17	17	16	17	20	30	16	18.6
B. Instr.	--	20	10	1	8	4	8	18	4	4	2	5	6
C. Group Lesson	0	0	0	0	0	2	0	10	0	0	0	0	1.3
14. Aide Help	--	20	10	20	20	4	20	20	20	20	20	20	18.2
15. Aide do:													
A. Pupil Supr.	20	20	20	6	0	4	12	20	20	10	8	20	11.1
B. Clerical	20	20	20	20	0	0	0	0	3	10	8	4	5
C. Instr.	20	20	20	20	20	0	20	0	0	0	20	8	9.8
16. Spec. Tch. (subj)	12	12	12	24	12	4	4	12	13	12	24	20	13.9
Aide?	F	F	F	P	P	P	P	P	P	P	P	P	P
Full (F)													
Part (P)													

Table 4. Responses to Teacher Grouping Questionnaire, Subject by Teacher by Grade Level: Grade K(A).

Group Pupils For Instruct.?	Teachers by Subject											
	<u>Reading: Teachers</u>			<u>Math: Teachers</u>			<u>Science: Teachers</u>			<u>Soc Stu: Teachers</u>		
	<u>A</u>	<u>B</u>	<u>C</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>A</u>	<u>B</u>	<u>C</u>
Yes/No (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
# of Groups	1	1	1	1	1	1	1	1	1	1	1	1
Min/Wk	--	--	--	--	--	--	--	--	--	--	--	--
<u>How Assign?</u>												
A=Ability	--	--	--	--	--	--	--	--	--	--	--	--
I=Interest	--	--	--	--	--	--	--	--	--	--	--	--
O=Other	XX	--	--	XX	--	--	XX	--	--	XX	--	--
<u>Freq. of Regrouping/Yr</u>												
6 wks or so	--	--	--	--	--	--	--	--	--	--	--	--
at least twice	--	--	--	--	--	--	--	--	--	--	--	--
No	--	--	--	--	--	--	--	--	--	--	--	--
Pupil (n)	13	10	12									

\*Full-time teachers only, and no split grades.

V=Variable, xx: as needed/per tutors

Table 5. Responses to Teacher Grouping Questionnaire, Subject by Teacher by Grade Level: Grade 1(A).

	Teachers by Subject															
	<u>Reading: Teachers</u>				<u>Math: Teachers</u>				<u>Science: Teachers</u>				<u>Soc Stu: Teachers</u>			
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
Group Pupils For Instruct.?																
Yes/No (Y/N)	Y	Y	Y	Y	Y	N	N	Y	N	N	N	Y	N	N	N	N
# of Groups	5	3	3	V	5	--	--	7	--	--	--	7	--	--	--	--
Min/Wk	150	30	150	50	150	--	--	50	--	--	--	40	--	--	--	--
<u>How Assign?</u>																
A=Ability	--	A	A	A	--	--	--	A	--	--	--	--	--	--	--	--
I=Interest	--	--	I	I	--	--	--	A	--	--	--	--	--	--	--	--
O=Other	XX	XX	XX	XX	XX	--	--	XX	--	--	--	--	--	--	--	--
Freq. of Regrouping/Yr																
6 wks or so at least twice	Daily	V	V	X	Daily	V	--	X	--	--	--	--	--	--	--	--
No	--	--			--	--	--	--	--	--	--	--	--	--	--	--
Pupils (n)	15	14	16	15												

V=Variable, xx. Mixed groups by skills, but group works well together/peer interactional partners.

Table 6. Responses to Teacher Grouping Questionnaire, Subject by Teacher by Grade Level: Grade 2(A).

Group Pupils For Instruct.?	<u>Reading: Teachers</u>				<u>Math: Teachers</u>				<u>Science: Teachers</u>				<u>Soc Stu: Teachers</u>			
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
Yes/No (Y/N)N	N	N	Y	Y	N	N	Y	N	N	N	N	N	N	N	N	N
# of Groups	1	1	3	6	1	1	4	1	1	1	1	1	1	1	1	1
Min/Wk	--	--	30	150	--	--	180	--	--	--	--	--	--	--	--	--
<u>How Assign?</u>																
A=Ability	--	--	A	A	A	--	A	--	--	--	--	--	--	--	--	--
I=Interest	A	--	I	I	--	--	--	--	--	--	--	--	--	--	--	--
O=Other	XX	--	XX	XX	XX	--	XX	--	--	--	--	--	--	--	--	--
<u>Freq. of Regrouping/Yr</u>																
6 wks or so	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--	--
at least twice	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
No	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pupils (n)	18	15	18	19												

\*Full-time teachers only, and no split grades.

V=Variable, xx: Cooperative learning models/random/partners.

Table 7. Responses to Teacher Grouping Questionnaire, Subject by Teacher by Grade Level: Grade 1(B).

	<u>Reading:</u> <u>Teachers</u>		<u>Math:</u> <u>Teachers</u>		<u>Science:</u> <u>Teachers</u>		<u>Social Studies:</u> <u>Teachers</u>	
	<u>A</u>	<u>B</u>	<u>A</u>	<u>B</u>	<u>A</u>	<u>B</u>	<u>A</u>	<u>B</u>
Group Pupils For Instruct.?								
Yes/No (Y/N)	Y	Y	N/Y	N	N	N	N	N
# of Groups	3-4	V	(some)	1	1	1	1	1
Min/Wk	150	300	V	--	--	--	--	--
<u>How Assign?</u>								
A=Ability	A	A	A		--	--	--	--
I=Interest	I	--	I	I	--	--	--	--
O=Other	--	--	--	Team	--	--	--	--
<u>Freq. of Regrouping/Yr</u>								
6 wks or so	X	X	X	X	--	--	--	--
at least twice	--	--	--	--	--	--	--	--
No	--	--	--	--	--	--	--	--
Pupils (n)	23	23						

\*Full-time teachers only, and no split grades.

V=Variable, depending on situation; Team = based on teamwork ability.

Table 8. Responses to Teacher Grouping Questionnaire, Subject by Teacher by Grade Level: Grade 1 (Burke County).

	<u>Reading: Teachers</u>				<u>Math: Teachers</u>				<u>Science: Teachers</u>				<u>Soc Stu: Teachers</u>			
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
Group Pupils For Instruct.?																
Yes/No (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N
# of Groups	6	3	2	5	4	X	2	2	6	1	1	1	1	1	1	1
Min/Wk	40	60	300	150	40	XX	150	30	40	--	--	--	--	--	--	--
<u>How Assign?</u>																
A=Ability	A	A	A	A	A	--	A	A	--	--	--	--	--	--	--	--
I=Interest	I	I	I	I	I	--	--	--	--	--	--	--	--	--	--	--
O=Other	--	--	--	R	--	X	--	--	--	--	--	--	--	--	--	--
<u>Freq. of Regrouping/Yr</u>																
6 wks or so	X	--	X	X	X	--	X	--								
at least twice	--	X	--	--	--	X	--	X								
No	--	--	--	--	--	--	--	--								
Pupils (n)	16	16	16	16												

\*Full-time teachers only, and no split grades.

V=Variable, xx: as needed/peer tutors/cooperative learning; R=Random.

Table 8 continued.

Group Pupils For Instruct.? Yes/No (Y/N) # of Groups Min/Wk	<u>Reading: Teachers</u>					<u>Math: Teachers</u>					<u>Science: Teachers</u>					<u>Soc Stu: Teachers</u>				
	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>	<u>I</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>	<u>I</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>	<u>I</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>	<u>I</u>
Yes/No (Y/N)	Y	Y	N	N	Y	Y	Y	N	N	Y	N	N	N	N	Y	N	N	N	N	Y
# of Groups	V	V	1	1	V	V	V	1	1	V	1	1	1	1	V	1	1	1	1	V
Min/Wk	V	V	--	XX	V	V	V	--	XX	V	--	--	--	XX	V	--	--	--	XX	V
<u>How Assign?</u>																				
A=Ability	A	A	--	--	A	A	A	--	--	A	--	--	--	--	A	--	--	--	--	A
I=Interest	I	I	--	--	I	I	I	--	--	--	--	--	--	--	--	--	--	--	--	--
O=Other	XX	XX	--	--	XX	XX	XX	--	XX	XX	--	--	--	XX	XX	--	--	--	XX	XX
<u>Freq. of Regrouping/Yr</u>																				
6 wks or so	--	--	--	V	--	--	X	--	V	--	--	--	--	V	--	--	--	--	X	--
at least twice	X	X	-	-	X	X	--	--	--	X	--	--	--	X	X	--	--	--	X	X
No	--	--	--	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	X	--
Pupils (n)	16	17	15	15	16															

\*Full-time teachers only, and no split grades.

V=Variable, xx: as needed/peer tutors/cooperative learning; R=Random.



Grade 1 practices seem quite consistent regardless of class size. (Pupil n is reported for each teacher on the Tables.) Most grade 1 teachers (13 of 15 or 86%) reported grouping for reading instruction, using from 2 - 6 groups. This practice occurred in classes of 15 as well as in classes of 23. The amount of time spent in groups per week varied from 30 to 300 minutes. Students were assigned to groups based on ability, interest, and as needed by the teachers.

Grouping for math in grade 1 (school A, school B, and Burke Co.) was less uniform. Only 7 of 15 (47%) teachers reported using groups. The number of groups varied from 2 - 7, and students were assigned by ability, interest, or as needed by the teacher. Essentially science and social studies are taught in whole-group processes with only 4 of 15 (27%) teachers reporting some specific grouping practices.

Class-size difference (1:15 and 1:23) was not a major factor in the use of groups. In the small classes, fewer children were observed using the same amount of materials that would be provided for a regular class. This situation allows each child more actual space in the class and greater access to materials. A calmer classroom was readily apparent in the small classes. Space and the number of pupils per group are likely to influence the amount of individual instruction and teacher/pupil engaged time for learning. Opportunities for each child to respond and to be engaged are much greater when there are only a few children in each group. Teachers can monitor a few students more easily than they can monitor a larger group, thus identifying students who are not grasping a concept and who need more help. This has the potential for increasing student achievement.

#### Teacher Problem Checklist (TPC) Data

The Teacher Problem Checklist (Cruickshank et al., 1980) is a series of 61 questions pertaining to five problem areas: time issues, pupil control, parent relations, student success, and affiliation. This checklist asks teachers to respond to a) how frequently is this a problem?; and b) when it does occur, how bothersome is the problem? Teacher participation and response were voluntary in this study. Table 9 indicates fully usable responses for the TPC.

Table 9

Grade Levels and Approximate Class-Size of Respondents to Teacher Problem Checklist

<u>School</u>	<u>Grade 1</u>	<u>Other</u>	<u>Total</u>
1 (A)	4 (1:15)	7 (1:15)	11
2 (B)	2 (1:23)	2 (1:23)	4
3 Burke Co.	8 (1:16)	--	8
4 Burke Co.	9 (1:16)	--	9
<hr/>			
Totals	n=23	n=9	n=32

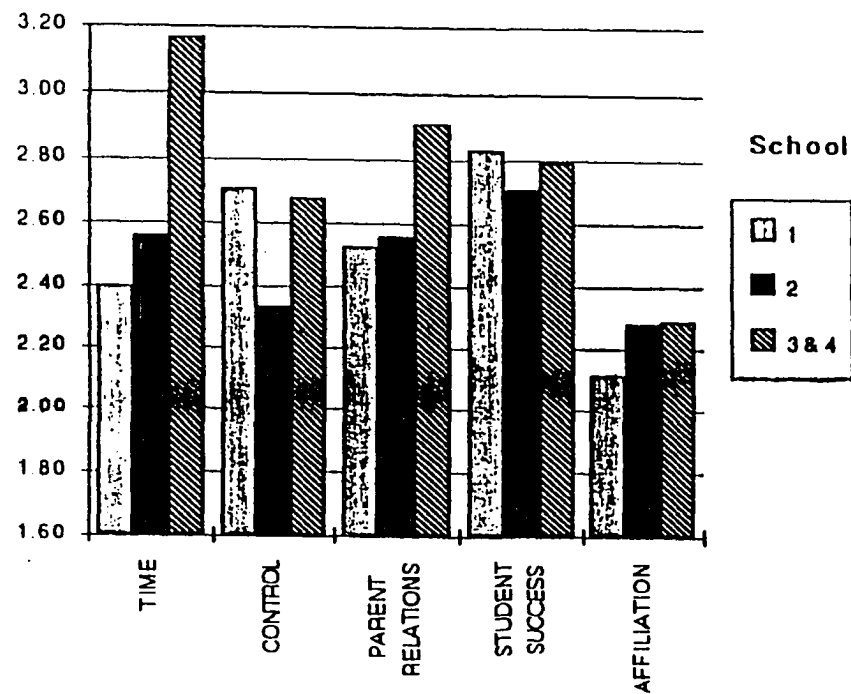
The small number of respondents, especially in the two schools (A and B) of primary interest in this study, precludes any detailed quantitative analysis of TPC responses. Responses are reviewed descriptively and to identify trends. When considering these generalizations, note that a) all classes in school A in grades K-2 were small (1:12 - 1:18) with grade-1 classes about 1:14; b) in Burke County, only grade-1 teachers (n= 17) responded and classes were about 1:16 and had been that size since 1991; c) the two grade 1 teachers in school B had large (1:23) classes. In Project STAR with some 1000 respondents (over 300 in small classes) there were no significant differences among teacher groups (small class 1:15, regular 1:25 class, or regular class with full-time assistant) except on the Time cluster items (Word et al., 1990).

Generalizations that can be made involve bothersomeness of control and bothersomeness of problems by school (Figure 2). Of the five problem areas and two dimensions, frequency and bothersomeness (total of 10 categories) the grade 1 teachers (overwhelmingly small classes, 27 to 2) found 9 categories to be less of an issue than did teachers in K and grade 2; the category that differed was bothersomeness of "control", and this was less than 0.1 difference. Figure 3 presents the analysis of "bothersomeness" of the problems by school (A, B, and Burke Co.). This figure shows that in all five problem categories the teachers in the small-classes list the problems as less bothersome than do the teachers in school B (1:23). The TPC results show that the problems occur less frequently and are less bothersome in grade 1 classes, and also throughout school A where most K -2 classes were small.

#### Teacher Observation Data

The teacher observation data constitute a major source of the information about "life in the 1:15 classroom". The researcher collected communication event data during classroom observations and recorded them on the PIT data collection forms (see Appendix G). Data were reduced from these forms and changed to percents for use in discussions. The researcher was interested in total communication events and in any changes in communication categories. Table 10 shows the worksheet for pre and post event totals and event changes in school A. Table 11

	FREQUENTLY		
	Mean Score		
	School		
	1	2	3&4
TIME	2.40	2.56	3.17
CONTROL	2.71	2.33	2.68
PARENT RELATIONS	2.53	2.56	2.91
STUDENT SUCCESS	2.83	2.71	2.79
AFFILIATION	2.11	2.28	2.29



	BOTHERSOME		
	Mean Score		
	School		
	1	2	3&4
TIME	2.40	2.59	2.65
CONTROL	2.88	2.88	2.68
PARENT RELATIONS	2.81	3.19	2.95
STUDENT SUCCESS	2.83	2.90	2.65
AFFILIATION	1.72	2.56	2.33

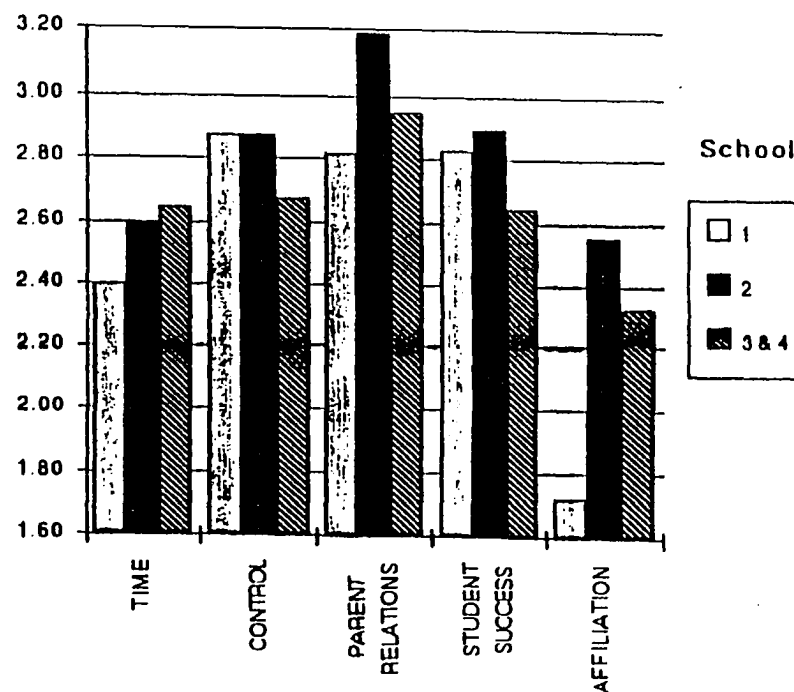
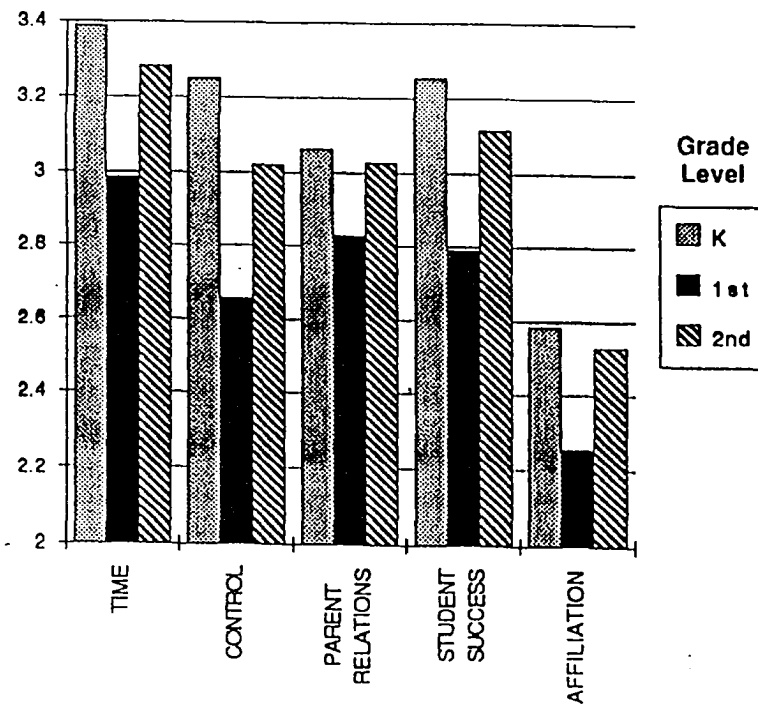


Figure 3. Teacher Problem Checklist Responses of Schools A, B, and Burke County.

<u>FREQUENTLY</u>				
<i>Mean Score</i>				
School				
	K	1st	2nd	
TIME	3.39	2.99	3.28	
CONTROL	3.25	2.66	3.02	
PARENT RELATIONS	3.06	2.83	3.03	
STUDENT SUCCESS	3.25	2.79	3.11	
AFFILIATION	2.58	2.26	2.53	



<u>BOTHERSOME</u>				
<i>Mean Score</i>				
School				
	K	1st	2nd	
TIME	3.16	2.61	3.13	
CONTROL	2.63	2.73	2.65	
PARENT RELATIONS	3.03	2.95	3.28	
STUDENT SUCCESS	2.89	2.62	2.85	
AFFILIATION	2.53	2.24	2.44	

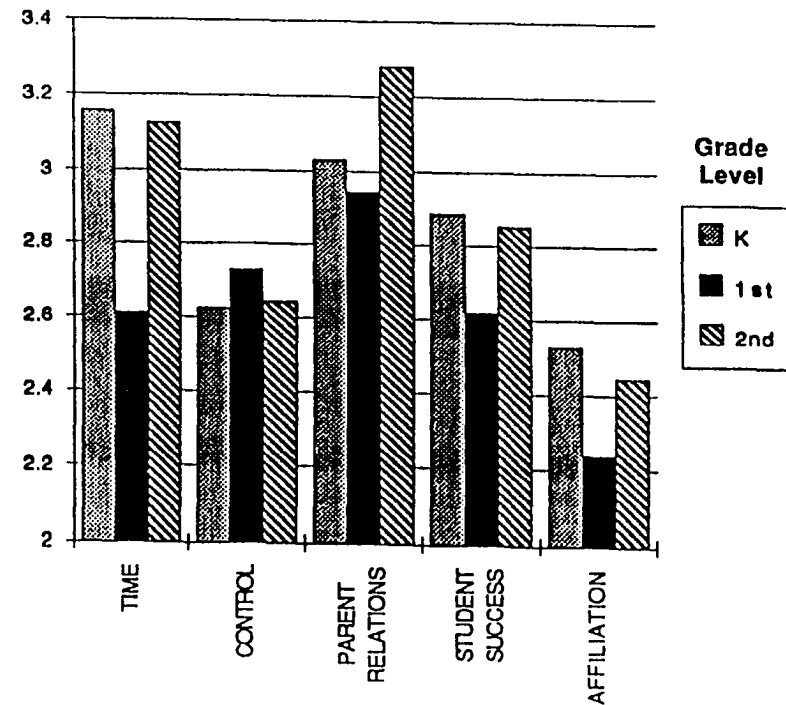


Figure 2. Teacher Problem Checklist Responses of School A.

Table 10. Worksheet: Pre and Post Data (n) for Changes and Totals in School A.

<u>Changes</u> <u>Grades</u>	<u>T<sub>1</sub></u>		<u>T<sub>g</sub></u>		<u>Sub.T</u>		<u>I<sub>1</sub></u>		<u>I<sub>g</sub></u>		<u>Sub.I</u>		<u>P<sub>1</sub></u>		<u>M</u>		<u>Total (n)</u>	
	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>
K	56	32	29	27	85	59	14	13	26	8	40	21	5	3	0	0	130	83
1	55	45	40	59	95	104	44	35	28	35	72	70	7	3	1	0	175	177
2	37	24	39	41	76	65	56	20	25	11	81	31	3	1	3	0	163	97
Total	148	101	108	127	256	228	114	68	79	54	193	122	15	7	4	0	468	357

<u>Totals</u> <u>Grades</u>	<u>T<sub>1</sub></u>		<u>T<sub>g</sub></u>		<u>Sub.T</u>		<u>I<sub>1</sub></u>		<u>I<sub>g</sub></u>		<u>Sub.I</u>		<u>P<sub>1</sub></u>		<u>M</u>		<u>Total (n)</u>	
	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>
K	169	361	50	250	219	611	32	35	30	13	62	48	7	5	0	0	288	664
1	768	538	473	489	1241	1027	144	84	106	105	250	189	16	8	1	0	1508	1224
2	203	81	163	364	366	445	151	28	75	47	226	75	5	0	0	0	597	520
Total	1140	980	686	1103	1826	2083	327	147	211	165	538	312	28	13	1	0	2393	2408

Table 11. Worksheet: Pre and Post Data (n) for Changes and Totals, School B.

<u>Totals</u> <u>Grades</u>	<u>T<sub>1</sub></u>		<u>T<sub>g</sub></u>		<u>Sub.T</u>		<u>I<sub>1</sub></u>		<u>I<sub>g</sub></u>		<u>Sub I</u>		<u>P<sub>1</sub></u>		<u>M</u>		<u>Total (n)</u>	
	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>
K	139	--	90	--	229	--	57	--	40	--	97	--	1	--	0	--	327	--
1	205	298	325	301	530	599	53	139	87	142	140	281	2	7	0	1	672	888
2	239	--	101	--	340	--	54	--	109	--	163	--	4	--	0	--	507	--
Total	583	298	516	301	1099	599	164	139	236	142	400	281	7	7	0	1	1506	888

<u>Changes</u> <u>Grades</u>	<u>T<sub>1</sub></u>		<u>T<sub>g</sub></u>		<u>Sub.T</u>		<u>I<sub>1</sub></u>		<u>I<sub>g</sub></u>		<u>Sub I</u>		<u>P<sub>1</sub></u>		<u>M</u>		<u>Total (n)</u>	
	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>
K	23	--	14	--	37	--	26	--	14	--	40	--	1	--	0	--	78	--
1	58	57	46	52	104	109	42	32	26	21	68	53	2	3	0	1	174	166
2	44	--	39	--	83	--	34	--	30	--	64	--	4	--	0	--	151	--
Total	125	57	99	52	224	109	102	32	70	21	172	53	7	3	0	1	403	166

shows the worksheet for pre and post event totals and event changes in school B. Table 12 shows the worksheet used to convert K and 2 data to numbers and percents for total communication events and communication event changes in schools A and B. "Pre" observations were conducted in late fall 1993, and post observations were conducted in May, 1994.

The researcher followed the general PIT instructions (see Appendix A) to analyze the total communication events and the changes [e. g. from (P) to (T) to (I)] in communication events to individuals (i) or to groups (g).

Table 13 presents the percent totals of pre and post communication events for grades K-2 at schools A and B. This table provides the totals by PIT and (i) and (g) both within category [e.g., (Ti) and Tg)] and across categories [(P) + (I) + (T)]. Table 13 shows that 51% of the pre-observation communications for school A, grade 1 were (Ti) but only 31% of School B, grade 1 communications were (Ti). For the (Ti) category, school A had 48% pre-observation events. School B had only 39% (Ti) pre-observation events. For the (Ii) category 59% of school A, grade 1 were (Ii) and 38% of school B, grade 1 communications were (Ii). The complement (Ig) category shows that 62% of school B, grade 1 (pre) communications were to the group (for example, correcting class behavior) but that only 41% of school A, grade 1 (Ig) communications were to the group. More personal corrective behavior directions were used by the teachers and were directed to the individual in school A than in school B. This calm, low-key approach set the tone for the 1:15 classrooms and gave the general impression of quiet order.

Table 14 shows the percents of pre and post communication event changes for grades K-2 in schools A and B. In terms of category subtotals, Table 14 shows that there was considerable consistency in the comparisons (pre/post and school A and school B and grade 1/grades K and 2) in the changes in communication cues. What differences there were paralleled the differences in percents of subtotals shown in Table 13.

Tables 15 and 16 show that researchers recorded 7195 total communication events and 1394 communication event changes in schools A and B (grades K-3). Table 15 shows the



Table 12. Worksheet to Convert K and 2 Data to Numbers and Percents for Totals and Changes in Communications Events, Schools A and B.

<u>Totals</u>	<u>T<sub>1</sub></u>		<u>T<sub>g</sub></u>		<u>Sub. T</u>		<u>I<sub>1</sub></u>		<u>I<sub>g</sub></u>		<u>Sub. I</u>		<u>P<sub>1</sub></u>		<u>M</u>		<u>Total (n)</u>	
	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>
A K	169	361	50	250	219	611	32	35	30	13	62	48	7	5	0	0	288	664
2	203	81	163	364	366	445	151	28	75	47	226	75	5	0	0	0	597	520
TOT	372	442	213	614	585	1056	183	63	105	60	288	123	12	5	0	0	885	1184
% CAT	64	42	36	58	100	100	64	51	36	49	100	100						
% TOT	42	37	24	52	66	89	21	5	12	5	33	10	1	*	0	0	100	100
B K	139	--	90	--	229	--	57	--	40	--	97	--	1	--	0	--	327	
2	239	--	101	--	340	--	54	--	109	--	163	--	4	--	0	--	507	
TOT	378	--	191	--	569	--	111	--	149	--	260	--	5	--	0	--	834	
% CAT	66	--	34	--	100	--	43	--	57	--	100	--						
% TOT	45	--	23	--	68	--	13	--	18	--	31	--	1	--	0	--	100	
<u>Changes</u>																		
A K	56	32	29	27	85	59	14	13	26	8	40	21	5	3	0	0	130	83
2	37	24	39	41	76	65	56	20	25	11	81	31	3	1	3	0	163	97
TOT	93	56	68	68	161	124	70	33	51	19	121	52	8	4	3	0	293	180
% CAT	58	45	42	55	100	100	58	63	42	37	100	100						
% TOT	32	31	23	38	55	69	24	18	17	11	41	29	3	2	1	0	100	100
B K	23	--	14	--	37	--	26	--	14	--	40	--	1	--	0	--	78	--
2	44	--	39	--	83	--	34	--	30	--	64	--	4	--	0	--	151	--
TOT	67	--	53	--	120	--	60	--	44	--	104	--	5	--	0	--	229	--
% CAT	56	--	44	--	100	--	58	--	42	--	100	--						
% TOT	29	--	23	--	52	--	26	--	19	--	45	--	2	--	0	--	99*	--

\*Totals may not equal 100 due to rounding.

Table 13. Percents of Pre and Post Communication Events (TOTALS) Compared by Schools A and B, Grades K-2.

<u>Totals</u> <u>Grades</u>	<u>T<sub>i</sub></u>		<u>T<sub>g</sub></u>		<u>Sub. T</u>		<u>T<sub>i</sub></u>		<u>I<sub>g</sub></u>		<u>Sub I</u>		<u>P<sub>i</sub></u>		<u>M</u>		<u>Total (n)</u>	
	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>
<u>K</u>																		
A %CAT	77	59	23	41	100	100	52	73	48	27	100	100	100	100	100	100	100	100
%TOT	59	54	17	38	76	92	11	5	10	2	22	7	2	1	0	0	100	100
B %CAT	61	--	39	--	100	--	59	--	41	--	100	--	100	100	100	--	100	--
%TOT	43	--	28	--	70	--	17	--	12	--	30	--	*	--	0	--	100	--
A-BCAT	16		-16		--		-7		7		--		--	--	--	--	N/A	
A-B TOT	16		-11		6		-6		-2		-8		1	1	--	--		
<u>Grade 1</u>																		
A %CAT	62	52	38	48	100	100	59	44	41	56	100	100	100	100	100	100	100	100
%TOT	51	44	31	40	82	84	10	7	7	9	17	15	1	1	0	0	100	100
B %CAT	39	50	61	50	100	100	38	49	62	51	100	100	100	100	100	100	100	100
%TOT	31	33	48	34	79	67	8	15	13	16	21	31	*	*	0	0	100	100
A-BCAT	23	2	-23	-2	--	--	21	-5	-21	5	--	--	--	--	--	--		
A-B TOT	20	11	-17	6	3	17	2	-8	-6	-7	-4	-16	*	*	--	--	N/A	
<u>Grade 2</u>																		
A %CAT	55	18	45	82	100	100	66	37	33	63	99+	100	100	100	100	100	100	100
%TOT	34	16	27	70	61	86	25	5	13	9	38	14	1	0	0	0	100	100
B %CAT	70	--	30	--	100	--	33	--	67	--	100	--	100	100	100	--	100	--
%TOT	47	--	20	--	67	--	11	--	21	--	32	--	*	--	0	--	100	--
A-BCAT	-15		15		--		33		-34		--		--	--	--	--		
A-B TOT	-13		7		-6		13		-8		6		*	--	--	--	N/A	
<u>TOTAL</u>																		
A %CAT	62	47	38	53	100	100	61	47	39	53	100	100	100	100	100	100	100	100
%TOT	48	41	29	46	77	87	14	6	9	7	22	13	1	1	0	0	100	101
B %CAT	53	50	47	50	100	100	41	49	59	51	100	100	100	100	100	100	100	100
%TOT	39	33	34	34	73	67	11	15	16	16	27	31	*	*	0	0	100	100
A-BCAT	9	-3	9	3	--	--	20	-2	-20	2	--	--	--	--	--	--		
A-B TOT	9	8	-5	12	4	20	3	-9	-7	-9	-5	-18	*	*	--	--	N/A	

\* = less than 1 percent. Totals not equal to 100% are due to rounding.

%CAT = percent of each category, e.g., of T<sub>i</sub> or of T<sub>g</sub>.

CAT = Category

Table 14. Percents of Pre and Post Communication Events (CHANGES) compared by Schools A and B, Grades K-2.

<u>Changes</u> <u>Grades</u>	<u>T<sub>i</sub></u>		<u>T<sub>g</sub></u>		<u>Sub.T</u>		<u>I<sub>i</sub></u>		<u>I<sub>g</sub></u>		<u>Sub.I</u>		<u>P<sub>i</sub></u>		<u>M</u>		<u>Total (n)</u>	
	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>
<u>K</u>																		
A %CAT	66	54	34	46	100	100	35	62	65	38	100	100	100	100	100	100	100	100
%TOT	43	39	22	33	65	71	11	16	20	10	31	25	4	4	0	0	100	100
B %CAT	62	--	38	--	100	--	65	--	35	--	100	--	100	100	100	100	100	--
%TOT	29	--	18	--	47	--	33	--	18	--	51	--	1	--	0	--	99	--
A-B CAT	4		-4		--		-30		30		--		--		--	--		
A-B TOT	14		4		18		-22		2		-20		3		--	--	N/A	
<u>Grade 1</u>																		
A %CAT	58	43	42	57	100	100	61	50	39	50	100	100	100	100	100	100	100	100
%TOT	31	25	23	33	54	59	25	20	16	20	41	40	4	2	*	0	99*	101
B %CAT	56	52	44	48	100	100	62	60	38	40	100	100	100	100	100	100	100	100
%TOT	33	34	26	31	60	66	24	19	15	13	39	32	1	2	*	*	100+	100+
A-B CAT	2	-9	-2	9	--	--	-1	-10	1	10	--	--	--	--	--	--		
A-B TOT	-2	-9	-3	2	-6	-7	-1	1	1	7	2	8	3	0	*	*	N/A	
<u>Grade 2</u>																		
A %CAT	49	37	51	63	100	100	69	69	31	31	100	100	100	100	100	100	100	100
%TOT	23	25	24	42	47	67	34	21	15	11	50	32	2	1	2	0	101	100
B %CAT	53	--	47	--	100	--	53	--	47	--	100	--	100	100	100	--	100	--
%TOT	29	--	26	--	55	--	23	--	20	--	42	--	3	--	0	--	100	--
A-B CAT	-4		4		--		16		-16		--		--		--	--		
A-B TOT	-6		-2		-8		11		-5		8		-1		2		N/A	
<u>TOTAL</u>																		
A %CAT	58	44	42	56	100	100	59	56	41	44	100	100	100	100	100	100	100	100
%TOT	32	28	23	36	55	64	24	19	17	15	41	34	3	2	1	0	100	100
B %CAT	56	52	44	48	100	100	59	60	41	40	100	100	100	100	100	100	100	100
%TOT	31	34	25	31	56	66	25	19	17	12	43	32	2	2	0	*	101	100+
A-B CAT	2	-8	-2	8	--	--	0	-4	0	4	--	--	--	--	--	--		
A-B TOT	1	-6	-2	5	-1	-2	-1	0	0	3	-2	2	1	0	--	*	N/A	

\* = less than 1 percent. Totals not equal to 100% are due to rounding.  
 CAT=Category. %CAT=Percent of each category, e.g., of T<sub>i</sub> or of T<sub>g</sub>.

Table 15

Percents of Total Communication Events (P.I.T. by Individual or Group) for Schools and Grades

	Total (n) Events	EVENTS (%)*					
		T	I	P	M	In	Gp
Grade 1 (A)	2732						
Pre	1508	82	17	1		61	38
Post	1224	84	15	1		51	49
Grades K&2 (A)	2069						
Pre	885	66	33	1		64	36
Post	1184	89	10	1		43	57
Grade 1 (B)	1560						
Pre	672	79	21	*		39	61
Post	888	67	31	1		49	50
Grades K&2 (B)							
Pre	834	68	31	*		59	41
--							
<u>Grades</u>							
K-3 (Pre) A	2393	77	22	1		63	37
(Pre) B	1506	73	27	*		50	50
Diff (A-B)		4	-5	1		13	-13
K-3 (Post) A	2408	87	13	*		47	53
K-3 (Post) B	888	67	31	1		49	50
Total Events (A)	4801	81	18	1		55	45
Total Events (B)	2394	71	28	1		50	50
A (K-3) Pre	(2393)						
A (K-3) Post	(2408)						
B (K-3) Pre	(1506)						
B (1) Post	(888)						

Grand Total 7195 Communication Event Totals

\*= $\leq$ less than 1%. Totals not equal to 100% are due to rounding.

Table 16

Percents of Communication Event Changes (P.I.T. by Individual and Group) for Schools andGrades

	Total (n) Changes	CHANGES (%)*					
		T	I	P	M	In	Gp
Grade 1 (A)							
Pre	175	54	41	4	*	60	40
Post	177	59	40	2		47	53
Grades K&2 (A)							
Pre	293	55	41	3	1	59	41
Post	180	69	29	2	0	51	49
Grade 1 (B)							
Pre	174	60	39	1	*	58	42
Post	166	66	32	2	*	55	46
Grades K&2 (B)							
Pre	229	52	45	2	0	57	42
--	--	--	--	--	--	--	--
Grades K-3							
Pre A	468	55	41	3	1	59	41
Pre B	403	56	43	2	0	58	42
Diff A-B		-1	-2	1	1	1	-1
Total Changes (A)	825						
Total Changes (B)	569						
A (K-3) Pre	468						
A (K-3) Post	357						
B (K-3) Pre	403						
B (1) Post	166						
Grand Total	<u>1394</u>	Communication Event Changes					

\* = less than 1%. Totals not equal to 100% are due to rounding.

distribution of total communications by schools (A or B), by grade K-2, if appropriate and at pre and post times. Total communication events in schools A and B were very similar in terms of distribution to individuals and to groups. The ratio for school A (i/g) was 55/45, and the ratio was 50/50 for school B. Internal analyses show that in school A (1:15), in grade 1 and in grades K and 2, the communications to individuals were more pronounced at pre than at post observation. In school A, there was more balance between individual and group communications at post than at the pre observation (going from 63/37 to 47/53). At pre-observation, grade 1 (school A) communication was 61% individual about the same as the school average for K-2 and in grade 1 (school B) communication to individuals was 39%. At post observation, school A (grade 1) had decreased individual and school B (grade 1) had increased individual, so grade 1 in school A (51%) and school B (49%) were much alike in terms of communications to individuals.

This picture of individual communications reveals one-on-one work early in the year in the 1:15 classroom with a transition to more group work by the later observations. The 1:23 classrooms show an opposite pattern, with less individual communication and more group communications in the beginning of the year.

The key to this study is on-task work in classrooms. On-task work registers in the PIT system as task (T) events distributed between the individual and group. Table 15 shows a pre/post consistency for grade 1 teachers in school A (82%/84%) for pre/post (T) communications. In the pilot test the (T) communications were 76% of all communications in small classes. By the end of the study (post observation) other 1:15 classes in school A (grades K and 2) had moved from 66% to 89% (T) communication. Total school A task communication went from 77% in the pre observations to 87% in the post observations. This increase shows a strong pattern of on-task work in the classrooms. In the regular (1:23) condition, (T) communications were about 10% less than in school A. In fact, (T) communications in school B, grade 1 decreased from pre to post observation by nearly 12% ( from 79% to 67%). The (I) or

institutional communications increased. Researchers could sense this increasing need for control and for keeping pupils orderly in the 1:23 classes as the end of the school year approached. Classroom atmospheres were still calm in the 1:15 classrooms at the end of the school year, with total (I) cues going from 22% to 13% as (T) increased with a slight shift from individual to group activities. (One got the sense that the 1:15 groups were just getting to their peak learning modes at the end of the study. Researchers felt that if the study were longer and the post assessment later, the grade 1, school A group would have shown greater gains). Consistency of communication in 1:15 is another finding in this study. Grade 1 (T) communication (school A) was about 83% and (I) communication was about 16% for both pre and post observations (Table 15).

Table 16 shows event changes [(P) to (T) or (I), etc.]. The changes are similar to the total events shown in Table 15.

#### Student Test Results

At the request of the County School System personnel, pupils at both schools took a pre and post administration of the California Achievement Test (CAT) Level II, Form E (1985 norms). Due to the late start of the project, the pretest was administered December 10-12, 1993. About 3.5 months later, the posttest was given on March 29, 1994. County School personnel scored the tests, and the pre and post results were provided to the researcher. CAT scale scores and NCE data provided achievement data. These scores were aggregated by teacher (school A had 4 teachers with small classes of about 14 pupils; school B had 2 teachers with "regular" classes of about 23 pupils and one teacher with a K-1 split with 10 first graders).

Only the scores of pupils who were present for both pre and post testings were used in the analyses, to counteract any pupil mobility between testing times, except for teacher and school comparisons on NCE data when all pre and post scores were used. In schools A and B there were fewer than 10 pupils who either did not take a pre or post test, or who had moved in or out of the classrooms being studied between December, 1993 and April, 1994.

Despite the careful attempt of researchers to "balance" the schools on key demographics (race, SES, percent Chapter 1, etc.), pretests showed that pupils in school B (1:23) were ahead academically (on items measured by the CAT Total Reading) of pupils in school A at pretest time; school B exceeded school A with grade 1 average NCEs of 26.4 to 14.3, a difference of 12.1 NCEs ( $p \leq .010$  when analyzed by teacher or classroom). Table 17 is based on NCE data and is used here descriptively to relate the pre and post mean NCE results for schools A and B by teachers on CAT total reading achievement. Students at school B retained their advantage over students at school A at the posttest (35.1 to 28.6 NCEs or a difference of 6.5;  $p \leq .14$  when analyzed by teacher). School A's mean NCE on CAT Total Reading increased 14.3 and school B's mean NCE increased 8.7. At the time of the pretest, school B had a 12.1 NCE advantage over school A. This advantage was reduced to 6.5 NCE at posttest. School A had further to go from its pretest NCE average of 14.3 as compared to school B at 26.4. The low average NCEs at both schools show the difficulty of the educational task to try to get these pupil populations to "average" (50.0 NCE) on standardized tests. Yet, since school B began at the higher point, it would be expected that school B would progress (achieve) at a faster rate than would school A students. This was not true, as shown by a significant ANCOVA  $p \leq .0001$ .

The grade equivalency (months) gain between pre and post testing is instructive. Only 3.5 months elapsed between the pre and post tests. This 3.5 months included December holidays and an unusual number of "snow days" during the winter of 1994. Average grade equivalency gains by pupils in each teacher's class in school A, grade 1 between pre and post tests were: 5.9, 4.3, 5.5, and 4.7, with a grade one average of 5.1 in a 3.5 month time. Only 6 (11%) pupils failed to achieve at least one NCE out of the 56 matched pre-post pupil tests. One NCE per year is the minimum desired Chapter 1 gain.

There were four grade 1 teachers in school A and three in school B (one of whom taught a K-1 split grade). In school B there were 103 grade 1 pupils who had complete pre and post



Table 17

Pre and Post Mean NCE Results for Schools A and B, by Teachers, on CAT Total Reading

	<u>Mean NCE</u>		<u>Mean NCE Gain</u>	<u>Students in Both Tests (n)</u>
	<u>Pretest (n)</u>	<u>Posttest (n)</u>		
<u>School A</u>	14.3 (63)	28.6 (61)	14.3	56
Teacher 1	7.8 (16)	30.8 (16)	23.0	14
2	27.2 (15)	36.1 (15)	8.9	12
3	7.1 (16)	21.0 (16)	13.9	16
4	15.7 (16)	26.9 (14)	11.2	14
 <u>School B</u>	 26.4 (53)	 35.1 (51)	 8.7	 47
Teacher 1*	33.6 (10)	40.6 (10)	7.0	10
2	25.5 (21)	28.1 (22)	2.6	18
3	24.0 (21)	39.7 (20)	15.7	19

\*This was a K-1 split grade.

data sets, and 93 pupils not in the K-1 split had complete pre and post scores. The analyses would ideally use only the class averages for school A ( $n=4$ ) and for school B ( $n=2$ ) as the study was of classrooms, not of individual pupils. The low  $n$  was a problem when this analysis was run. The Analysis of Covariance (ANCOVA) was also employed using pupils in each school, and again using the pupils in each school minus the pupils in the K-1 split. Pupil scale scores were used and ANCOVA applied due to the greater achievement levels in school B at pretest time on the CAT. In the ANCOVA model, pretest data were the independent variable and posttest data were the dependent variable. Full data for the ANOVA and ANCOVA analyses appear in Appendix K, pages 138 to 149. Pages 138 to 140 show pretest and posttest comparisons on scale scores (one-factor ANOVA); pages 141 to 148 show the ANCOVA analyses. Table 18 shows the analysis in summary form.

Table 18 shows the summary data of the one-factor ANOVA and ANCOVA analyses, including the mean scores. Pupils in school A started with significantly lower scores (305.64 to 385.04;  $p \leq .003$ ) than pupils in school B and also ended that way (407.79 to 448.89;  $p \leq .042$ ). Despite this uneven start, pupils in school A had a mean score gain greater (11.3) than did pupils in school B. This difference translated into an ANCOVA result of  $p \leq .00$  favoring school A using the pupil as the unit of analysis for both 103 pupils and for 93 pupils (removing the  $n=10$  pupils who were in school B in the K-1 split grade). The ANCOVA difference using the class as the unit of analysis, ( $n=6$  and  $n=7$ ) was still  $p \leq .001$  favoring school A.

### Personal Narratives

Three of the four grade 1 teachers at school A submitted personal reflective narratives written during a staff development activity. Three distinct categories (Early reading experiences, Influential persons, and Reflections on reading today) emerged when the narratives were subjected to content analysis.

Table 18

Summary of One-Factor ANOVA and ANCOVA Using Total Pupils (n=103) and also ANCOVA Using Pupils n=93 (removing K-1 split grade) as well as Analyses by Class Average Scores

<u>ANOVA</u>		<u>Mean Scores</u>		
	<u>n</u>	<u>Pre</u>	<u>Post</u>	<u>x Gain</u>
A	56	305.64	407.79	102.15
B	47	358.04	448.89	90.85
Total	103			
	Difference	52.4	41.10	11.30
<u>By Student Analysis (n=103 students)</u>				
	Pretest Dfiference (A vs B)	$p \leq .003$	Df 102 (1, 101)	
	Posttest Difference (A vs B)	$p \leq .042$		
<u>By Teacher Analysis (n=7 teachers)</u>				
	Pretest	$p \leq .016$	Df 102 (6, 96)	
	Posttest	$p \leq .139$		
<u>ANCOVA</u>				
	Pupil n=103	$p \leq .000$	Df 102 (1, 1, 1, 99)	
	Pupil n=93	$p \leq .000$	Df 92 (1, 1, 1, 89)	
	Teachers n=6	$p \leq .00$	Df 92 (5, 1, 5, 81)	
	Teachers n=7	$p \leq .00$	Df 102 (6, 1, 6, 89)	

Early reading experiences. All three teachers expressed some type of negative experience associated with their early reading in school. One teacher discovered in the fourth grade that she had a form of dyslexia. Her transition from picture books to chapter books was extremely difficult. If she read aloud, she lost the meaning of the text due to the effort she had to make to read the words correctly. This teacher comments, "I was rarely embarrassed, but I lived in fear of "it" (being called on to read aloud). A second teacher also disliked reading aloud. Her negative memory associated with early reading concerned being in the "middle reading group" and wondering if she would ever get to move up to the top group. The third teacher's negative early reading experience focused on feeling intimidated by a particular second-grade teacher at a new school. Reading became a way for this child to escape her teacher. She went to another class for reading group because she was an advanced reader.

Two of the three teachers expressed positive memories associated with early reading experiences. One teacher expressed a strong desire to learn how to read. Being one of six children motivated this child to want to read just like her siblings. Another teacher remembers reading as an enjoyable activity. She expressed early confidence in her ability to read, and considered herself to be a good reader. She enjoyed reading aloud to her classmates.

Influential persons. All three teachers identified at least one significant person who influenced their reading and achievement. Two participants were influenced by former teachers; one was influenced by the fourth grade teacher who discovered the form of dyslexia and who worked diligently to get this child to make the transition from reading picture books to reading chapter books on a high interest level to the student. Another participant was influenced by a twelfth grade teacher who "convinced me that regardless of family history and other expectations, I could rise to the top and go beyond what people expected". Two participants were also influenced by family members; one participant believed that her parents held high expectations for reading and school achievement for her. Therefore, she pushed herself and struggled through honors courses. Another participant was influenced by an

admired older cousin who failed to complete her bachelor in education degree. This participant learned from her cousin's experience and vowed to "achieve more and never to give up."

Reflections on reading today. Two of the three teachers expressed thoughts about their reading today. The two who expressed these thoughts had also expressed more negative early reading experiences. The participant who wondered if she would ever move from the middle group to the top group states that she is still a slow reader. She used Cliff Notes in school to compensate for her reading speed and says, "I could kick myself now because I missed some really good books". She also states, "Once again the desire to read has returned". She enjoys a good novel, and she tries to read every night before bed. The participant who discovered that she had the form of dyslexia says that she became a strong auditory learner. She rarely read all of the assignments in her masters degree program; she listened carefully and skimmed the assignments. She completed the program with a 4.0 GPA. As a teacher, she prereads anything that she reads to her class and is particularly sensitive to all modes of learning in her students. She has developed a love of poetry and marvels that an author can put so much meaning into so few words. She writes her own poetry today.

#### Informal Interview Question

Teachers at school A were asked to respond in a brief narrative form to the following question: Please make comments (positive or negative) about differences you see between small classes (1:15) and the regular-size (1:23) classes. Four grade 1, one grade 2, and two K teachers responded to this question. These brief narratives were subjected to categorization via content analysis. Six of the seven responses contained the phrase "more time to spend with individual students". Several teachers mentioned that each child in the small class had more personal space and greater access to materials, thus leading to more hands-on learning than would students in larger classes. Four of the seven responses referred to easier classroom management, "discipline problems can be stopped before they start". Several teachers mentioned that the

small class-size (1:15) lends itself to a "family-like atmosphere" in which the teacher can know the students better and the students can know their teacher and peers better. Several comments concerning assessment and evaluation appeared. Teachers stated that it was easier to assess children and their learning styles in the small class environment. The phrases used by one teacher, "It's [teaching in the small class (1:15)] do-able --you can hear children read individually at least once a day; it's do-able -- you can make home-visits and know the children's families," sum up the general tone of these narratives about the differences between small (1:15) and regular (1:23) classes.

Near the end of this study, (May, 1994) teachers from school B, the control school with regular (1:23) classes, observed in the small (1:15) classes at school A. These teachers were asked to respond in brief narrative form to the differences observed between small (1:15) and regular (1:23) classes. Three responses were received and subjected to categorization via content analysis. All three respondents spoke of the teacher having more time to spend with children individually. One teacher mentioned that a teacher would know the students better. Two teachers commented on classroom management being easier that there were more calmness and control in the small (1:15) class than in the regular (1:23) class. All three teachers mentioned the calm atmosphere and low noise level of the small classes. These differences observed post hoc by the visiting regular (1:23) class-size teachers were all observations that were made by the small (1:15) class-size teachers about the benefits of 1:15.

#### Data in 1994-1995

The four first-grade teachers at school A were an unique group in that their only teaching experiences were in small-classes (1:15). These teachers taught in small-classes (1:15) during the 1992-1994 school years. Budget cuts at the school system level resulted in the loss of teaching positions at school A for the 1994-1995 school year, so these same four grade 1 teachers then taught regular-size (1:24) first-grade classes. In December of 1994, the school A principal

interviewed the first-grade teachers to get their observations about teaching small classes as compared to teaching regular-size classes.

Fourteen of the 17 responses listed under the heading of Immediate Observable Benefits of Class Size of 15 (see Appendix L) began with the word more. Teachers listed:

- 1) more individual attention for children;
- 2) more personal space per student and more space to develop hands-on discovery learning.
- 3) more personal teacher-student conversations with more time for students to get to know each other and more time for teachers to get to know student families (developing that sense of community);
- 4) more time for teachers to diagnose student learning styles and to diagnose how students are thinking to determine their understandings and misunderstandings;
- 5) more students reading on more advanced levels with all students participating in seminars discussing literature on their level;
- 6) more students understanding math concepts, not simply writing numbers and number facts;
- 7) more time to give attention to "troubled kids" resulting in fewer discipline problems and office referrals;
- 8) a wide range of ability levels able to learn together with more self-confidence for learning regardless of abilities;
- 9) teachers reported more energy for collegial planning, producing creative thematic lessons;
- 10) a sense of peacefulness in the classroom.

The following 12 statements were submitted under the heading Immediate Observable Outcomes of Class Size of 24:

- 1) I cannot meet all subject needs daily.

- 2) I used to have daily reading conferences. Now I read individually with each child about two times weekly.
- 3) I feel frustrated that in the critical first-grade year, I cannot assess student reading individually and specify the focus they need.
- 4) Students used to read to me every day. They still want to do this, and it seems to hurt their feelings if they can't.
- 5) This at-risk population needs daily help. I want to give that help but can't get to them as often as they need.
- 6) I don't know the children as well as when I had a small class.
- 7) During each lesson now, each child does not get to answer. Last year each child answered three and four times in each lesson.
- 8) Lessons are 15 to 25 minutes longer as I check all children. I do more "up front" teaching. This leaves little time for students to do the independent exploratory learning and thinking.
- 9) There are more student conflicts in the classroom.
- 10) There is less space for each child.
- 11) I have to move on before all students have learned. Last year I could make sure every child learned what he/she was supposed to learn.
- 12) Students do not present their work orally as often.

These teachers' comments on the observed differences between a class of 15 and a class of 24 speak clearly to the frustration of trying to meet more needs (24 students as compared to 15 students) with the same amounts of materials, space, time, and teacher attention. The comments are all the more poignant as these teachers were unusual in that they had not begun their teaching careers in large classes.



### Teacher Exit Interviews

The Teacher Exit Interview (TEI) form used in the present study was a minor modification and condensation of the form used in the Tennessee Project STAR, (Word, et al., 1990). This interview obtained qualitative data from teachers about their experiences teaching in a grade 1, small class (1:15). Project STAR researchers transcribed the TEI responses onto cards and identified categories based on topics contained in teacher responses. That is, they employed the strategy of grounded theory, letting categories emerge from the data (Glaser and Strauss, 1967). Category working definitions were developed and teacher responses were categorized. Fourteen of these response categories were selected and developed into the first-grade Teacher Exit Interviews (TEI). In Project STAR, teachers were asked to describe any differences between their present year's teaching experiences regarding that topic and related teaching experiences in previous years. Most of the STAR Project grade 1 teacher sample (n=347) had more than one year of experience on which to base their responses.

In this study, Teacher Exit Interviews were conducted in May, 1994. To compensate for the small grade 1 sample (n=4) and because only one of these teachers had more than one year of teaching experience, a 20-item questionnaire with all interview questions was distributed at school A to the four kindergarten, four grade 1, and four grade 2 teachers. Seven questionnaires were returned (1 kindergarten, 4 grade 1, 2 grade 2). The researcher conducted follow-up interviews on TEI probe point questions with the four grade 1 teachers. Response similarities between this study and Project STAR were identified to lend more credibility to the responses of the small sample (n=4). These responses and comparisons are discussed under the category headings developed by researchers in Project STAR.

### Grouping for Instruction

Grouping practices as identified in the interviews refer to numbers of groups, group purpose, group formation, determining group membership, and flexibility of group membership.

### Grouping and Small Class Teachers

Grade 1 teachers reported using small group instruction (primarily reading) in this study and in the STAR study.

### Time

The word time appeared in all school A grade 1 teacher responses. Teachers spoke of having "more" or "extra" time to assess student progress through small group instruction. Fewer children to teach resulted in faster accomplishment of instructional objectives, which resulted in more time for creating flexible groups to meet student needs and for enrichment. Grade 1 teachers in this study and in the STAR study reported more time for students to learn on their own using an inquiry approach. Teachers in school A had established learning centers where students could experiment and manipulate materials designed to complement units of study (webbing activities).

### Individual Attention

Teachers in this study and in STAR reported that they were able to give children more individual attention due to the small numbers in their classes. They reported that it was easier to monitor other students in the classroom not engaged with the teacher in a small group situation. The small size of the instructional group resulted in better identification of student problems and strengths.

### Classroom Management

Teachers found it easier to monitor students in the classroom even while engaged with a small group. One teacher stated that the smaller class-size "fosters closer relationships between children and produces fewer behavior problems". "Having fewer children also allows you to deal with a problem immediately". Teachers in this study and in STAR reported these findings.

### Classroom Physical Environment

Responses in this area centered around use of classroom space, noise level, traffic patterns, and room for learning centers.

#### Classroom Space

Project STAR and grade 1 teachers in this study all spoke of the increase of personal space for each child. "More space" led to a "lighter feeling or atmosphere" in the classroom. There was more space to set up permanent learning centers and for cooperative learning groups, which led to more children engaged in active learning. It was "easier to move" in the classroom. Fewer children with more personal space led to fewer conflicts between children.

#### Noise Level

Researchers noted the calm, orderly atmosphere in school A, grade 1 classrooms. Several of school B teachers noted this atmosphere and the "low noise level" when observing in school A classrooms. Lower student noise level meant that there could be lower teacher noise level; the teacher did not have to talk so loud. STAR teachers reported similar responses in this area of noise level.

#### Traffic Patterns

Clearly the increased student personal space in school A and in the STAR study grade 1 classrooms led to flexible classroom arrangement, increased numbers of enrichment activities and learning centers, and more opportunities for children to use these activities, thus contributing to student achievement.

#### Use of Classroom Learning Centers

Teachers responded to questions about the presence of, creating, managing, implementing, and the perceived effects of classroom learning centers.

#### Time

The word "time" appears again and again, time and time again, in both Project STAR and grade 1, school A teacher responses. Not only did the teachers report that they had more

time to set up the centers, the students had more time to use the centers. One teacher reported that the children were able to work "much more independently" in her classroom, resulting in more productive center activity. Fewer children meant less teacher and student time spent in group instruction and more time for independent, hands-on learning using centers. Not only was there more time, but the quality of center time was important. The calm, orderly classroom atmosphere of school A was evident during center time. The four teachers were able to coordinate their teaching by a process they called "webbing". Centers revolved around a unit theme. Webbing activities were a built-in, integral part of the day. With fewer students using a center, children did not have to rush to finish so that someone else could use the materials. Part of this "calm classroom atmosphere" could be related to teachers being able to monitor center activity more easily while engaging in small group or individual work with the rest of the class. Teachers in both STAR and this study reported fewer discipline problems due to fewer children competing for space and materials.

#### Classroom Social Climate

Social climate responses refer to social interactions among children and between teacher and child. "Climate" was translated into such words as family, knowledge, and relationships.

#### Small Class as Family

Several teachers in school A, grade 1 referred to their class as having a "family atmosphere". "Each child knows their fellow classmates very well in the small class". Another teacher commented that there was a "willingness to help one another, and "students are concerned if a student is absent". Teachers in Project STAR and in this study described their classes as a "close knit group" that "worked together smoothly".

#### Teacher Knowledge of Children

Teachers of 1:15 in this study and STAR commented on how much better they knew their students. One teacher stated, "I have time to conference and have a conversation with each

child every day". Several teachers said that there was more time to listen to each child and more time for each child to talk. School A, grade 1 teachers and STAR teachers stated that they were able to provide more individual attention to each child due to the fewer number of children in each classroom.

#### Teacher-Student Relationships

Teachers of 1:15 in this study and in STAR reported feeling closer, to their students due to the small class size. Teachers of small classes had the time and the opportunity to share more about their lives with the children. Children in the small classes did not seem to get jealous when the teacher was sharing with another child; each child seemed to know that he/she would get a turn for teacher attention.

#### Learning Enrichment Activities

Enrichment activities refer to learning opportunities other than the standard classroom instructional activities (e. g. drama, cooking, field trips, art, and guest speakers).

Increased number of activities. Grade 1 teachers in this study and in STAR reported more time for enrichment activities because students in the small class finished the required work faster. It was easier to monitor these enrichment activities. Since there were fewer children and it was easier to monitor, teachers were more willing to provide the hands-on activities.

Types of enrichment activities added. Teachers of 1:15 in both studies (school A and STAR) reported an increase in drama activities (plays, puppet shows, etc. in the 1:15 condition). It was easier to involve all children in a drama activity because of the lower number of children. No one had to "wait their turn". Grade 1 teachers in school A had time to bring in related literature for units of study. Fewer children were easier to monitor on a field trip, thus teachers planned more field trips. Teachers in STAR and this study stated that there was more time to do "fun" activities (cooking, etc.), activities that made school enjoyable for children.

### Classroom Discipline

Teachers responded to a question concerning classroom discipline (e.g. student behavior problems, the bothersomeness of this behavior, and techniques used to deal with problem behavior).

Number of discipline problems. Grade 1 teachers in Project STAR reported fewer discipline problems in comparison to previous years of regular class-size teaching. These teachers felt that since each child had more personal space, there were decreased negative interactions in the small classes. School A, grade 1 discipline referrals decreased from 38 in 1991-92 (regular-size classes) to 28 in 1992-93 (small-size classes) to 14 in 1993-94 (small-size classes). School A grade 1 teachers explained that it was easy to monitor the behavior of fewer students "stop it before it starts". The teacher could deal with a problem "right away". Both sets of teacher responses noted the increase of individual attention that each student received in 1:15 as a contributing factor to fewer discipline problems. Teachers in this study mentioned that they had time to conference with each student every day. Project STAR teachers reported that "the kids knew that they didn't have to act up to get my attention". Students knew that they would get the attention they needed.

### Monitoring and Evaluating Pupil Progress

Teachers responded to questions concerning assessing student progress, monitoring student progress, and teacher feedback about student progress.

### Ease and Speed of Monitoring and Evaluation

Teachers at school A and in the STAR study kept stating how fewer children made it easy for them to know how each child was progressing and to identify student strengths and weaknesses. Since it took less time to evaluate fewer students, more teacher time was created for reteaching and enrichment.

### Individual Attention

Grade 1 school A teachers and STAR teachers spoke again and again about their ability to provide individual attention to students. Assessment was conducted on the spot and reteaching provided immediately to those who did not grasp the concept. Teachers reported being better able "to know where each child was with his/her learning". Teachers were able to give special individual homework because of this increased knowledge of student progress.

### Evaluation Methods

Having only about 15 children in the classroom led teachers in this study and STAR teachers to use "on the spot evaluation". Assessment occurred as teachers observed children in class. There was less need for paper and pencil tests. Grade 1 teachers at school A used math and communication skills assessments, writing folders, and individual reading logs to assess students. Having only about 15 children to assess increased teacher knowledge of student progress.

### Teacher Morale and Work Attitudes

Teachers responded to questions concerning teacher morale, stress, health and well-being. Three of the four grade 1 (1:15) teachers in this study reported using few sick days and having little job-related stress. This was also true in Project STAR responses where many teachers reported that they were working harder with the small class but they were not as tired because of the reduced number of students. One teacher in this study reported high stress and frustration due to the severity of developmental and behavioral problems that the children at school A were bringing with them to school.

### Parent Involvement

Teachers responded to questions concerning parent involvement in the classroom, parent-teacher communication, and home-environmental factors. Three of the four grade 1, school A teachers reported considerably more parent involvement than in the previous year. Parents came into the school to work individually with students. All four teachers reported increased

communication with parents. One teacher stated "I can do home visits and build a strong bond with my students' families". Overall, the Project STAR small class teachers also reported more time to send notes and make phone calls to parents which strengthened parent-teacher relationships.

#### Use of Teacher Assistants

All teachers in grade 1 small classes in Project STAR and in this study shared the services of a teacher assistant. Most teachers in both used these assistants for clerical duties and supervision (e.g. lunch, recess), and not for instruction.

#### Classroom Instruction

Teachers responded to questions concerning instructional grouping, instructional goals, and time for instruction. All grade 1, school A teachers responded that they used more small group and individualized instruction this year as compared to their first year of teaching in a small class (1:15), but since they had not taught in large classes they felt that the small class size allowed them the time, opportunity, and flexibility to utilize these methods. Teachers in this study and STAR reported more time to listen to children read every day and more time for "getting everything (instructional goals) in."

#### Response to Research Questions

**QUESTION ONE:** What type(s) and amount of teacher-pupil communication (Task, Institutional, Personal, Mixed) occur in small classes (approximately 1:15) and in larger classes (approximately 1:23) in grade one?

Of the 2,732 communication events observed and recorded at school A, 1,508 were recorded in pre observation and 1,224 were recorded in post observation. (See Table 15, p. 64.) In the pre observation, 82% of grade one, school A communication events were (T) Task, 17% (I) Institutional, and 1% (P) Personal. A high percentage (61%) of these events were to the individual, with 38% to the group. This high percentage of (T) Task communication events to the individual (i) was about the same in school A small classes regardless of grade.



The researcher recorded 1,224 grade 1 post observation events at school A (1:15), with 84% (T) Task, 15% (I) Institutional, and 1% (P) Personal. At post observation, researchers noted a balance between individual (51%) and group (49%) communications.

In comparison, researchers observed and recorded 1,560 total communication events at grade 1 of school B, 672 pre observation and 888 post observation. Pre observation showed 79% (T) Task, 21% (I) Institutional, and less than 1% (P) Personal communication events. Post-observation results were 67% (T) Task, 31% (I) Institutional, and 1% (P) Personal communication events. This decline in task communication events could be attributed to teacher fatigue as the year progresses.

**QUESTION TWO:** What are the differences in the types and amounts of teacher-pupil communications (Task, Institutional, Personal, Mixed) between small classes (approximately 1:15) and regular classes (approximately 1:23) in grade one?

School A, grade 1 communications were consistently high task (82% and 84%) and low (17% and 15%) institutional for the pre and post-observations. This pattern of high task, low institutional communication events was evident throughout School A. School A, grade 1 began the year with more individual communication 61% and 38% group. By May, 1994, individual and group communications were balanced with 51% individual and 49% group. School B, grade 1, began the year with fewer (39%) communications to the individual and more (61%) to the group. By May, 1994, school B, grade 1 communications were balanced (as were those in school A) with 49% individual and 50% group.

The greater emphasis on group communication in the beginning of the year in the regular-size class (1:23) may be due to the need to gain control and establish procedures quickly over a large number of students. As students become accustomed to classroom procedures and begin to function orderly, the teacher can devote more time to individual communication. In contrast, school A (small class-size 1:15) teachers utilized more individual communication at the beginning of the year and more group communication toward the end of the year. This

practice may be attributed to less need for establishing control quickly because of the fewer number of students in the class. Teachers in the small classes had the opportunity to spend more time with individuals and then move toward group work at the end of the year as the class matured.

A difference in (T) Task and (I) Institutional communication was noted between school A and school B from the pre to post observations. School B, grade 1 (T) Task events decreased from pre (79%) to post (67%) observation. As (T) Task decreased, percents of (I) Institutional communication events increased from pre (21%) to post (31%). This pattern was observed by the researchers in school B. As the end of the year approached, a greater need for institutional types of communication arose as students needed to be reminded of various rules and procedures. These types of institutional communications take away from on-task activities. With the smaller class, there seemed to be less need for reminders about procedures and rules, thus netting more time for on-task instruction.

Few (P) Personal communication events were noted in either school A or B, emphasizing that school, as we know it, is very much task-oriented, no matter the size of the class.

**QUESTION THREE:** Did a change in teacher behavior in small classes occur after teachers received some in-service relating to small-class size?

Due to the consistency of school A grade 1 high task (82 % and 84%) and low institutional (17% and 15%) communication events throughout the course of this study, it is concluded that there was little change in measured/observed teacher behavior after the grade 1 teachers participated in some inservice experiences relating to small class-size. The "treatment" or in-service for these teachers consisted of a) being a part of this study (Halo or Hawthorne effect potential), b) visits to a school system using 1:15 for several years (Burke County), c) reading about and discussing benefits of 1:15 (e.g., Project STAR), d) visits to a school in Tennessee using innovative teaching strategies, e) work with a consultant to help the teachers analyze their own teaching reflective processes, f) and general involvement in a

development process and research inquiry (a strong staff-development process by itself, according to Sparks, and Loucks-Horsley, 1989).

Even though the in-service opportunities during this project may not have seemed to influence the observed communication events in the classroom, these four grade 1 teachers did engage in professional growth work. This lack of observed change may be due to an unusual pre-existing conditions: These teachers began their teaching careers in small classes (1:15) in the school year of 1992-93. Three of these teachers were first-year teachers; one teacher was a second-year teacher. During the 1992-93 school year, they participated in 20 hours of staff development, studying strategies for active learning for six-year olds. This staff development included thematic planning, whole language approaches, seminar discussions, use of manipulatives, and computer assisted learning. Teachers visited small class-size rooms in Burke County. They became colleagues who supported each other, challenged their own premises, and replanned as strategies worked and failed. Their focus was finding ways to work with all children.

In the second year of the small-class project (1993-94) they continued the weekly planning sessions. They worked from an agenda and an action plan. Occasionally, the grade 1 teachers joined in grade-level discussions with the kindergarten and second-grade teachers. These conversations reflected on the results of their teaching as it related to the achievement of the students. All of these processes lead to professional growth. All school A, grade 1 teachers received ratings of standard, above standard, and well above standard on the eight areas of the Teacher Performance Appraisal Instrument. The depth of teacher reflection in the personal narratives indicates professional growth. These narratives indicate mature teachers who are able to reflect on their own experience and apply learning gleaned to working in the lives of first graders.

**QUESTION FOUR:** What generalizations can be made about teaching in small (1-15) classes at school A (the focus of the study) as compared with small-class teaching in another system that has used small classes for several years?

School A, grade 1 teacher observations and experiences of small-class teaching were compared to grade 1 teacher comments from the STAR project in an earlier section in this chapter (Teacher Exit Interviews). School A, grade 1 teacher comments were compared to other small class-size teachers in the Burke County school system. Burke County has had small (1:15) classes in some schools at some grade levels since 1991.

In May of 1994, small class-size teachers (grades 1, 2, & 3) responded to a brief narrative questionnaire that asked teachers to address the following areas: 1) the benefits of small classes (1:15), 2) the problems associated with small classes (1:15), 3) the major differences between teaching in small (1:15) classes and teaching in regular (1:25) classes [if the teacher had regular class-size teaching experience], and 4) and other comments. See Appendix F for a copy of the questionnaire. Seventy teachers responded in grade 1, 34 teachers responded in grade 2, and 10 teachers responded in grade 3 resulting in a total of 114 responses. Grade 1 respondents had an average 8.9 years of teaching experience with a range of 1-29 years. Grade 2 respondents had an average of 9.97 teaching experience years with a range of 1-29. The third grade small class (1:15) teachers averaged 15.2 years of teaching experience with a range of 1-30 years.

The Burke County grades 1, 2, and 3 small (1:15) class-size teacher questionnaire responses were analyzed using content analysis. In the school A and project STAR responses some of the same key comments emerged. When teachers were asked to list the benefits of small class-size (1:15) the four responses with the highest response rates (15-35 responses) were as follows: 1) more individualized student instruction, 2) better personal interactions between teachers and students ["I know my students much better"], 3) quicker and more thorough assessment of student skills, and 4) fewer discipline problems.

The four most common teacher responses to listing the problems in the 1:15 small classes had response rates of 5-20. Problems listed were: 1) too much paper work with no clerical help, 2) no assistant to share in preparation of materials and activities, 3) no breaks for the teacher, and 4) no one to supervise students if teacher needs to leave the classroom for an emergency. This may be due to the fact that before teachers had 1:15 in Burke County they had large classes with a full-time teacher assistant.

When teachers were asked to list the major differences between regular class-size (1:23) teaching and small class-size (1:15) teaching, these four responses emerged with response rates of 10-20: 1) Small classes have fewer discipline problems, 2) Small classes allow for more individuals to get the help that they need, 3) Small classes lend themselves to knowing individuals better, and 4) Student achievement is greater in small classes.

Of the total 114 respondents, only 40 responded to the general comments area on the questionnaire. Response rates for these items ranged from 5-25. The most common comments were: 1) Start classes at the beginning of the year with a small ratio (e.g. 1-13) so that student numbers will not go over 15, 2) "I've enjoyed teaching in small classes (1:15). We must continue this program!", 3) You get to know the children so much better with small classes., and 4) Some clerical assistance is needed.

**QUESTION FIVE:** What are the achievement differences between first graders in the small classes (approximately 1:15) and the first graders in the regular classes (approximately 1:23)?

There were achievement differences in the very beginning between first graders at school A and school B. Despite researcher attempts to find comparable schools on key demographics (race, SES, present Chapter One, etc.) school B first graders (average NCE 26.4) began the project 12.1 NCE ahead of school A first graders (average NCE 14.3) as of the pretest in December, 1994. This advantage was reduced to 6.5 NCE by the posttest when School A had a mean NCE of 28.6 and School B had a mean NCE of 35.1. School A had further to go from

pretest. The average grade equivalency gain across all teacher in school A, grade 1 for the 3.5 months of the study was 5.1, a significant gain for the time period.

The summary data for the one factor ANOVA and ANCOVA analyses using the mean scores to show that pupils in school A began the study with significantly lower scores (305.64 to 385.04)  $p \leq .003$  than school B pupils. Both schools completed the study with school A (407.79) to school B (448.89);  $p \leq .04$ . Even though school A pupils began behind school B, school A pupils had a mean score gain greater (11.3) than did pupils in school B. One would expect the differences between school A and school B pupils' scores to remain the same at posttest despite gains made by each group. A gap between school A and school B scores still existed at posttest, but this gap had narrowed from 12.1 pretest to 6.5 at posttest. These results show that small class size can lead to higher student achievement.

CHAPTER V  
SUMMARY, FINDINGS, CONCLUSIONS, IMPLICATIONS, AND DISCUSSION  
Summary

The purpose of this study was to identify and describe how teachers teach in small (approximately 1 teacher with 14 pupils or 1:14) grade 1 classrooms. This study was conducted in two schools (school A approximately 1:14 and school B approximately 1:23) in a North Carolina county school system. The data collection began in October, 1993 with culmination in May, 1994.

Although early class-size studies showed the presence of class-size effect (e.g., Word et al., 1990) the present study was planned primarily to determine why the effect occurred and how teachers and pupils communicated in small (1:15) classes. This study addressed the following questions concerning how teachers teach (communication events) in small-size classes (1:15) and regular-size classes (1:23).

1. What type(s) of and amount of teacher-pupil communication (Task, Institutional, Personal, Mixed) occurs in small classes (approximately 1:15) and larger classes (approximately 1:23) in grade 1?
2. What are the differences in types and amounts of teacher-pupil communications (Task, Institutional, Personal, Mixed) between small classes (approximately 1:15) and regular classes (approximately 1:23) in grade 1?
3. Did a change in teacher behavior in small classes occur after teachers received some in-service relating to small-class size?
4. What generalizations can be made about teaching in small classes at school A (the focus of the study) as compared with small-class teaching in another system that has used small classes for several years?

5. What are the achievement differences between first graders in the small classes (approximately 1:15) and the first graders in the regular classes (approximately 1:23)?

Classroom observations were conducted in kindergarten, grade 1, and grade 2 classrooms of school A (about 1:15) and school B (about 1:23). The study focus was the grade 1 classrooms in both schools. Classroom observations were coded using the PIT analysis system. This system operates on the assumption that classroom behavior may be observed as communication events. These communication events were classified as (P) Personal, (I) Institutional, (T) Task, and (M) Mixed. The data using the PIT were collected by classroom observation in December, 1993 and January, 1994 (pre) and February, March, and May, 1994 (post).

Various data collection processes were used in this study. Teachers at both schools completed questionnaires concerning grouping, parent contacts, and perceived problems. Interviews and personal narratives provided qualitative data for school A (1:15). Grade 1 students in school A and school B were pretested by the school system (December, 1993) and posttested (March, 1994) with the California Achievement Test or CAT (reading only) to provide student achievement data.

The PIT observation data were reported as percents for each category. Teacher questionnaire responses were tabulated and analyzed by grade and school. Test data were reported in various ways, but Scale Scores (SS) and National Curve Equivalents (NCE) were used for analysis and discussion in the present study. Interview and narrative data were subjected to categorization via content analysis.

### Findings

Findings from this study are:

#### Questionnaires

1. Most teachers with 1:15 ratio at school A utilized teacher assistants in clerical and supervisory roles. Most teachers with 1:15 ratio in Burke County utilized teacher assistants to assist with reading instruction.



2. Grade 1 teachers in school A and in Burke County registered considerably more total home visits than school B regular-size teachers (average per teacher).
3. All grade 1 teachers reported grouping for reading instruction regardless of class size. Groups ranged in number of 2-6 for reading instruction. Some grouping was reported for math in small- and regular-size classes.
4. The results on the Teacher Problem Checklist show that problems occur less frequently and are less bothersome in grade 1 small classes (about 1:15) in both school A (n=4 teachers) and Burke County (n=9 teachers) than in regular-size classes (n=3).

#### PIT Communication Event Observations

5. Grade 1 small-class teachers (school A) engaged in more individual communications in the beginning of the year (pre 61%, post 51%) and increased group communication toward the end of the year (pre 39% and post 49%). Grade 1 teachers in school B engaged in more group communication at the beginning of the year (pre 61%, post 51%) and more individual communication (pre 39% and post 49) by the end of the year.
6. On-task communication (instructional classroom work) is the key to student achievement. Grade 1, school A teachers show consistent (pre 82% and post 84%) task communications. Grade 1, school B task communications were less than in the small classes both at pre and post observations, and they decreased as the year progressed (pre 79% to post 67%).
7. Institutional communications decreased in grade 1, school A as the year progressed (pre 22%, post 13%). Institutional communications increased in grade 1, school B (pre 21%, post 43%). The increase in Institutional communications for school B indicates increased need to remind students of rules and procedures, and to enforce discipline, thus leaving less time for instruction. This finding, combined with the finding on Task communication (item #6) gives each child in the small-class setting almost two times ( $84\% \div 15 = 5.6$ ) as much individual communication as each child in the regular-class setting ( $67\% \div 23 = 2.9$ ).

### Student Tests

8. Grade 1 students in school B had a 12.1 NCE advantage over grade 1 students in school A on the CAT pretest. When posttested, grade 1, school B had only a 6.5 NCE advantage over grade 1, school A students. This difference was statistically significant at  $p \leq .01$ .
9. There was an average 5.1 month gain in 3.5 months time for grade 1, school A students.
10. Despite an uneven beginning in test scores, pupils in school A had a mean score gain of 11.3 greater than did grade 1 pupils in school B, the large-size class.

### Interviews/Narratives

11. Teachers in small classes (1:15) report that they have more time to spend with individual students engaged in reading conferences, counseling, conversation and listening.
12. Small class teachers reported that students had more time for individual hands-on learning.
13. Teachers in small classes report that their classrooms have a "family-like atmosphere" where teachers and students know each other well. This condition also has few discipline problems.
14. Teachers in small classes reported that classroom management, assessment, evaluation, and discipline were easier because of fewer students in the class.
15. There appeared to be little change in grade 1, school A observed teacher behavior after participating in staff-development experiences relating to small class-size.

### Conclusions

Based on the data presented in this study, the following conclusions seem warranted:

1. Grade 1 small classes (1:15) teachers spent an average 10% more time on Task communications than grade 1 teachers at school B. This finding means almost two times as much Task communication for each student in the 1:15 classroom ( $84\% \div 15 = 5.6$ ) as compared to 2.9 Task communication for each student in the 1:23 classroom ( $67\% \div 23 = 2.9$ ). Small classes increase on-task instruction for students. This increase in instruction is supported in STAR

(Word et al., 1990) and other studies (Filby et al., 1980). These studies showed that teachers in 1:15 classes could provide more in-depth lessons, thus moving through the curriculum more quickly.

2. Grade 1 small class (1:15) teachers spent an average 14% less time on Institutional communications than grade 1 teachers at school B. Small classes decrease the amount of time utilized for behavior/procedural communications and thus increase time for on-task communications. Filby et al. (1980) and Word et al. (1990) found that 1:15 classroom management functioned more smoothly with less time spent on discipline, thus increasing the time for instruction.

3. Students in grade 1, school A small classes exhibited greater achievement gains in reading on the CAT than did grade 1, school B students. Even though grade 1, school B students scored a 12.1 NCE advantage over grade 1 students at pretest, this advantage was reduced to 6.5 NCE by posttest. Nye et al. (1994) stated that students in the 1:15 condition did statistically significantly better ( $p \leq .001$ ) than did students in regular and regular with a teacher assistant conditions. Small class students have greater achievement gains than students in regular classes.

5. Teachers feel that the small class environment provides students with a more appropriate learning environment than the regular-size classroom. Word et al. (1990) and Filby et al. (1980) found that students in 1:15 classes had more opportunities to engage in enrichment activities, students received more individualized attention, counseling, and monitoring. Small classes provide students with more personal student space, greater access to materials, more hands-on learning, and more time for enrichment activities. Small classes provide teachers with more time for conferencing with students, more time for assessment and evaluation, and easier classroom management and discipline.

6. Researchers in STAR (Word et al., 1990) and other authors (Tomlinson, 1988) have found that there is little change in teacher behavior due to staff development. Some authors

(Tomlinson, 1988) use this finding as a reason for why reducing class size is not effective since teachers will use the same teaching behaviors regardless of class size. There appeared to be little change in teacher behavior due to the in-service presented to the 1:15 classroom teachers in this study. Recall, however, that this group of teachers was unique in that they had only taught in small classes and they began their staff development as soon as they began teaching in the 1:15 classes. Now that these teachers are teaching in regular classes (1:24), they find that they are unable to implement the methods that they used in the 1:15 situation as effectively in the 1:24 classroom. (See Appendix L.)

### Implications

The following implications for first grade and early primary education are drawn from the findings of this study:

1. Grade 1 and early primary grades class-size should be reduced to at least a 1:15 ratio in order to increase student achievement.
2. Grade 1 and early primary grades class-size should be reduced to at least a 1:15 ratio in order to create a more supportive environment to better meet the ever increasing social, emotional, physical, medical, and mental needs of today's children. This supportive and appropriate learning environment allows more time for individualized attention, counseling, and monitoring for students. It provides students with more personal space, greater access to materials, and more opportunities for hands-on learning.
3. In order for staff development related to teaching in small classes to be effective, perhaps it should be offered to teachers before they have the experience of teaching in regular classes. This is not to say that teachers who only have experience teaching in regular classrooms will not be effective as teachers in small classes. It is sometimes easier to establish new patterns of behavior when there are not so many old patterns in the way.
4. Grade 1 and early primary grades class-size should be reduced to at least a 1:15 ratio to better meet the needs of minority and low-income children. Word et al. (1990), Robinson (1990),

and Robinson and Wittebols (1986) note that minority and low-income children had higher achievement rates in small class situations.

5. Classroom observations in this study resulted in few Personal communication events in either the 1:15 or 1:23 classroom situation. Have we as educators emphasized the achievement aspect of education (higher test scores) at the expense of personal communication with children? This may be indication of an area for further study.

#### Discussion

This investigator believes that this study sufficiently addressed the research questions posed for consideration. Three questions are raised in this study that may suggest further areas of study. It has been shown that typical staff development is sometimes ineffective in changing teacher behaviors (Tomlinson, 1988). Yet the teachers in school A in this study were able to use their small-class staff development quite effectively. Was this due to the unique situation that these teachers had only taught in small classes? Could it have been due to the timing of their staff development (at the very beginning of their small-class teaching)? Teachers in Burke County small classes have experience in teaching in regular classes, and their program is quite effective. This raises the question of how to plan effective staff development for teachers in the small-class setting.

Findings in this study show that Task communication events increased in grade 1, school A classrooms and decreased in grade 1, school B classrooms as the year progressed. Grade 1, school A teachers began the year with more individual communication and moved to more group communication at the end of the year. Grade 1, school B teachers began the year with more group communication and moved to more individual communication at the end of the year. These findings give rise to some theoretical questions. Were grade 1, school A teachers able to maintain a high rate of Task communication because they began the year with more individual communication? Due to the small number of students, teachers could take time to get to know the students so that by the end of the year they could function at a high rate of Task as a group.

Could it be that because of larger numbers of students the regular classroom teachers didn't have the time to establish that individual relationship with the children at the beginning of the year, thus resulting in lowering Task communication? The rate of grade 1, school B individual communication had increased at the end of the year; but the amount of Institutional communication had also increased. This could mean that there was more Institutional/less Task communications going to some individual students. Could these students have been the students who needed more of that individual communication at the beginning of the year?

The third question raised by this study is the finding of few Personal communication events in the grade 1 classrooms no matter what the teacher/pupil ratio (1:15 or 1:23). What are the implications of these findings on young children? An emphasis on Task or Instruction results in higher achievement for students. If our very young children are coming to school more psychologically and emotionally and academically needy than in the past as suggested by current demographics (e.g., Hodgkinson, 1992; Hamburg, 1992), there is a need for emphasis on Task; but there is also a need for an emphasis on Personal communication to address the emotional and psychological needs of children.

This study found greater student achievement gains for students in the 1:15 classes. Teachers (school A, school B, Burke County, and STAR) believe that small classes as compared to large classes provide a more appropriate learning environment for young children by providing more opportunities for enrichment activities, individualized attention, counseling, monitoring, more personal space, greater access to materials, more time for assessment and more effective classroom management and discipline. These are not new findings. Teachers have been saying these things for years. The reasons for paying more attention to and acting on these findings have changed. Tomlinson (1988, p. 22) states that "the justification for small classes today is the same as it was 30 years ago. Yet a class that was thought just right is now deemed too large. What happened during the interim?" What happened, Tomlinson asks? Children and their living conditions have changed. Over 25% of America's children live in poverty

today (Hodgkinson, 1991, 1992; Hamburg, 1992). These children live with malnutrition, psychological stress and sickness every day. Children of poverty come to school less ready for school than do children from nonpoverty backgrounds. Word et al., (1990), Robinson (1990), and Robinson and Wittebols (1986) found that small classes result in higher achievement for low-income and minority students. Smaller classes could prove effective in addressing the needs of our growing number of children from poverty. Smaller classes could be a case when less (fewer children per teacher) could equal more (increased student achievement and a more appropriate learning environment for young children.)

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## Appendix A

### PIT Instrument

#### Personal Events

- Pupil expressions of frustration and teacher responses.
- Angry dialogue between two pupils concerning some action.
- Teacher concern for pupil family matters.

#### Institutional Events (Playing School)

- Roll call, announcements
- Lining up for lunch.
- Handing out materials; handing back papers.
- Students pretending to work.

#### Task Events (Major Teaching / Learning Interactions)

- Demonstration of how to read a map.
- Student report to the class.
- Teacher-pupil or pupil-pupil discussion on topic.
- Teacher assisting individual pupil with independent study.

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Galloway (1962) noted that a communication event can be defined as a sequence of teacher-pupil communicative behaviors separated from preceding and succeeding sequences of events (behaviors) by naturally occurring boundaries. Communication events are composed of both verbal and nonverbal behaviors by both teachers and pupils. It is not uncommon to find an entire event composed exclusively on nonverbal behaviors. It is also possible for a teacher to engage in two communication events simultaneously. Note a situation where a teacher asks a group a question about an assignment (Tg) and gestures to a single pupil to stop some "horseplay" (Ii).

\*From French, R.L., & Galloway, C.M. (nd). Communication Events: A New Look at Classroom Interactions, pp. 2-5.

## COMMUNICATION EVENTS: A NEW LOOK AT CLASSROOM INTERACTIONS\*

Russell L. French and Charles M. Galloway\*\*

Educators and researchers have profitably focused their attention on the behavior of the classroom teacher in an attempt to gain insight into the teaching-learning process. Vast amounts of behavioral data, greatly enriching our knowledge of "the way teaching is," have been contributed through these efforts. In short, the study of teacher behavior has yielded significant data concerning teacher-pupil relationships and classroom interactions.

However, it has probably occurred to every serious student of classroom behavior that most observational systems of behavioral analysis reduce teacher and pupil verbal and nonverbal expressions to their lowest level of meaning. Undoubtedly, many observers using the available systems feel the need for some larger rubric from which specific behaviors will gain a proper perspective in relationship to the totality of the teaching-learning act.

Growing out of this need for a broader perspective have been a number of attempts to place both teaching and teacher behavior in a communication framework. Hyman (1968) concluded: "Teaching is a specific case of a more general abstraction called communication."

Many who have attempted to place teacher behavior in a communication framework have displayed a logical tendency toward grouping behaviors into communication entities. For example, Smith and Meux (1962) and Galloway (1962) have suggested that teacher-pupil interactions can be viewed as "episodes." Lewis, Newell, and Withall (1961) described

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\* Reprinted with some editorial changes from a mimeographed paper that cites "Reproduced with permission of Educational Leadership." This article appears in the March, 1970 issue under the above title.

\*\* Russell French was Assistant Professor of Education in the Department of Curriculum and Instruction at the University of Tennessee, and Charles Galloway was Associate Professor of Education in the Department of Curriculum and Instruction at the Ohio State University at the time that this was written.

"communication acts." Bellack (1963) used the concept of "teaching cycles." And Openshaw and Cyphert (1966) have referred to "classroom encounters.

Most conceptualizations of communication entities have been defined in terms of (a) the characteristics of behaviors or activities in progress or (b) arbitrary allotments of time. However, a classroom observer soon becomes aware that teacher-pupil interactions have varying functions. To look at classroom interactions in light of their functions suggests the concept of communication events.

### Communication Events

A communication event can be defined as a sequence of teacher-pupil communicative behaviors separated from preceding and succeeding sequences of behaviors (events) by naturally occurring boundaries. As defined by Galloway (1962), these boundaries are: (1) a variation or change in the direction of a teacher's communicative behavior; (2) a change in the teacher's behavior toward a new interaction; (3) the occurrence of a significant or potent act that appears influential; and (4) social intervention in which an interruption is instigated by either a pupil or the teacher. As implied, communication events are composed of both verbal and nonverbal behaviors by both teachers and pupils. It is not uncommon to find an entire event composed entirely of nonverbal behaviors.

Observation of elementary and secondary classrooms suggests that what goes on there may be described as communication events that are institutional, task-oriented, personal, or mixed in nature.

### Institutional Events

Institutional events relate to managing the classroom and meeting the expectations of the institution. Jackson (1968) delineated this kind of event by posing questions relevant to their recognition in most classrooms: (1) "Who may enter and leave the room?" (2) "How much noise is tolerable?" (3) "How to preserve privacy in a crowded setting?" (4) "What to do when work

assignments are prematurely finished?" (5) "How far to go in establishing classroom-social etiquette?" The following illustrate institutional events:

- 1) A verbal and/or nonverbal reprimand to a student for chewing gum because this action is against school rules.
- 2) Teacher handing back quiz papers and explaining the grading procedures.
- 3) Teacher calling roll and pupils responding.
- 4) Pupils and teacher preparing to use a motion picture.
- 5) Teacher announcement and/or explanation of school events or activities.
- 6) Teacher calling for, signing, and discussing with pupils absence excuses.
- 7) Teacher cueing pupils verbally and/or nonverbally in an attempt to maintain silence or order and pupils responding.
- 8) Teacher directing pupils to begin their homework; pupils feigning industrious activity.
- 9) Teacher verbal and/or nonverbal directions to pupils in how to leave the classroom for some particular purpose.

### Task Events

Task events focus on the teaching and learning of subject matter content whether cognitive, affective, or skill-oriented. Task events are characterized by stating, asking, showing, acknowledging, and clarifying communicative behaviors on the part of both teachers and pupils, and some key words related to these behaviors are suggestive of the work of Bloom (1956) and Sanders (1966): remembering, understanding, applying, analyzing, synthesizing, evaluating. Illustrative task events include:

- 1) A teacher-pupil discussion of the functions of Congress.
- 2) A teacher demonstration of how to read a weather map.
- 3) teacher explanation of the factors influencing the Battle of Gettysburg while pupils take notes.



- 4) Teacher aiding individual pupils during an independent study period.
- 5) A student report.
- 6) A laboratory exercise in which pupils are using microscopes with the teacher assisting them.

#### Personal Events

Personal events are those in which personal needs, goals, and emotions of a pupil, a group of pupils and/or the teacher provide the central focus. Davitz (1964) has provided a rather extensive list of emotional expressions relevant to these events. The list includes admiration, affection, amusement, anger, boredom, cheerfulness, despair, disgust, dislike, fear, impatience, joy, satisfaction, and surprise. Typical personal events are:

- 1) Pupil expressions of frustration and teacher response to these.
- 2) Teacher expression of personal interest in or concern for a pupil or his/her problems.
- 3) Pupil expression of affection toward the teacher and teacher response, either verbal or nonverbal.
- 4) Angry dialogue between two pupils concerning actions or the playground.

#### Mixed Events

Mixed events also occur in classrooms. These contain elements of more than one of the event types previously described. While one might classify mixed events according to the elements which they contain (task-personal events, institutional-personal events, etc.), this is a somewhat difficult and useless procedure. Interaction and communication become distorted when the focus of an event becomes complex and when participants are no longer aware of the specific nature of the event. Therefore, the category "mixed events" better describes those behavioral sequences than does any further breakdown of the category.

#### Coding Communication Events

Personal, institutional, task, or mixed events can involve the teacher with a single pupil or with a group of pupils. Since any attempt to identify the focus and intent of interaction in the classroom at any given time must include clarification of the number of participants

involved, communication events must be classified as individual (interaction between the teacher and one pupils) or group (interaction between the teacher and several pupils).

A simple identification of classroom communication events involves a coding scheme utilizing the symbol (I) to signify institutional events, (P) for personal events, (T) for task events, and (M) for events which cannot be clearly defined (events mixed in nature). Further, institutional, task, or personal events involving the teacher with a single student (individual events) are indicated by the symbol i placed after the symbol characterizing the basic nature of the event (e.g., Ti, Pi, li).

An important aspect of a communication event is its duration. The facet is captured by tallying the appropriate reference symbol at the initiation of the event and marking continuance of the event with dots tallied at three-second intervals. [N.B.: In the SSS study we used 4- second intervals. Ed.] If this system is used, an observer's coding of a group-task event occupying twenty seconds of classroom time would resemble the following:

Tg  
•  
•  
•  
•

#### Recent Findings Relevant to Classroom Communication

Although research employing the PIT model (title derived from the first letter of each major communication event type previously described) has, as yet, been limited, application of the model to videotapes representing 1360 minutes of interaction in junior high school classrooms has determined the significance of the model and yielded some interesting data.\*

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\* Editorial aside: The PIT has been used in classroom studies after the present article was written. For example, see Crist, M. (1975, August). Application of the PIT model for recording teacher/pupil classroom in two schools for adjudicated youth. Unpublished doctoral dissertation, The University of Tennessee, Knoxville.

The 1360 minutes (23 hours) of interaction analyzed contained a total of 1705 separate communication events. Each 40-minute class period (34 periods in all) contained an average 50.4 events.

Of the total 1705 communication events, 1173 were task-oriented, with 794 of these being group-centered, task events and 379 involving the teacher with only one pupil. Single group, task events averaged 73.9 seconds in duration, while individual, task events occupied approximately 37.6 seconds each. Of the 50.4 events per class period, 34.5 were task-oriented. Task events, either group or individual, accounted for 69.2 percent of all events recorded. . . .

#### Suggested Applications of the PIT Model

The PIT model provides another perspective for descriptive research in classroom interaction, and the model has practical utility for classroom teachers, supervisors, and administrators. Due to its simplicity . . . and the fact that it can be easily learned, the PIT model offers the classroom teacher a means of analyzing his/her communication, particularly when videotape is available as a means of recording classroom activity. Given specific teacher goals and intents, supervisors and administrators can employ the model as one means of aiding teachers in improving their instruction and classroom communication. Further, the model may be used to gain insight into communication patterns appropriate and promising to teaching and learning at various grade levels, in various subject areas, and among various types of learners.

Finally, the PIT model may be used in combination with Flander's Interaction Analysis, French and Galloway's IDER System or other behavioral analysis systems to provide the observer with a clear picture of both individual teacher and pupil behaviors and broader communication patterns. Much can be gained from knowledge of the behaviors teachers commonly use to open and close particular types of communication events, behavioral patterns typically found in particular event types, etc. . . .

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## Appendix B

Student Grouping Questionnaire

School _____	Date _____
Teacher Name _____	
Class Size: Number of Pupils _____	
Teacher Assistant? <input type="checkbox"/> No <input type="checkbox"/> Part-time <input type="checkbox"/> Full-time	

We are interested in the extent to which you regularly divide children into groups for instruction. Please describe the groups you have within your class. Thank you for your assistance.

1. Do you divide your students into small groups for READING instruction on a regular basis? If so, please indicate the number of groups, and the average number of minutes spent in small grouped instruction each week.

\_\_\_\_\_ No                      \_\_\_\_\_ Yes

Number of Groups \_\_\_\_\_

Average Number of Minutes per Week \_\_\_\_\_

2. Do you divide your students into small groups for MATHEMATICS instruction on a regular basis? If so, please indicate the number of groups, and the average number of minutes spent in small grouped instruction each week.

\_\_\_\_\_ No                      \_\_\_\_\_ Yes

Number of Groups \_\_\_\_\_

Average Number of Minutes per Week \_\_\_\_\_

3. Do you divide your students into small groups for SCIENCE instruction on a regular basis? If so, please indicate the number of groups, and the average number of minutes spent in small grouped instruction each week.

\_\_\_\_\_ No                      \_\_\_\_\_ Yes

Number of Groups \_\_\_\_\_

Average Number of Minutes per Week \_\_\_\_\_

4. Do you divide your students into small groups for SOCIAL SCIENCE instruction on a regular basis? If so, please indicate the number of groups, and the average number of minutes spent in small grouped instruction each week.

\_\_\_\_\_ No                      \_\_\_\_\_ Yes

Number of Groups \_\_\_\_\_

Average Number of Minutes per Week \_\_\_\_\_

5. How do you assign the children to reading or math instructional groups? Please write a "1" for yes and a "2" for no.

	<u>Reading</u>	<u>Math</u>
A) By the child's skill level	_____	_____
B) By the child's interest	_____	_____
C) Other procedure(s)	_____	_____

If other, please specify:

-----

6. For reading and math do you move children from one group to another during the school year? Please indicate by using:

1 = Yes: Frequently  
(every six weeks or  
more often)

2 = Yes: Occasionally  
(less than every six  
weeks, but at least  
once during the year)

3 = No

A) Reading \_\_\_\_\_

B) Math \_\_\_\_\_

## Appendix C

Parent/Volunteer Interaction Questionnaire

School _____	Date _____
Teacher Name _____	
Class Size: Number of Pupils _____	
Teacher Assistant? <input type="checkbox"/> No <input type="checkbox"/> Part-time <input type="checkbox"/> Full-time	

Please respond using the past FOUR WEEKS as the reference.

1. During the past four weeks, how many times have you had a telephone conversation with a parent regarding his/her child's performance or behavior? \_\_\_\_\_
2. During the past four weeks how many times have you written a note to a parent regarding his/her child's school performance or behavior? \_\_\_\_\_
3. During the past four weeks, how many times have you held a scheduled conference with a parent, primarily to discuss his/her child's school performance or behavior? \_\_\_\_\_
4. Please estimate how many times during the past four weeks you have had an unscheduled contact with parents of children in your classroom. \_\_\_\_\_
5. During the past four weeks, how many times have you made a professional visit to homes of your students? \_\_\_\_\_
6. During the past four weeks, how many times have you sent a form letter communication home to parents, suggesting activities they should do at home with their child?  
\_\_\_\_\_
7. During the past four weeks, how many times have you sent a newsletter home to parents to inform them of past, current, or future classroom activities, topics of study, etc.?  
\_\_\_\_\_

8. During the past four weeks, how many times has a parent helped you with a maintenance task such as: cleaning tables, mending books or toys, fixing snacks, helping children with clothing, etc.? \_\_\_\_\_
9. Please estimate during the CURRENT SCHOOL year how many professional visits you have made to homes of your students. \_\_\_\_\_
10. As a whole, are you satisfied with the quality and quantity of parent interactions you have had this year? (Yes/No) \_\_\_\_\_
11. If you answer NO to #10, why are you dissatisfied? What will have to change for you to be satisfied with your interactions with parents?
12. During the past four weeks, how many times have you had a volunteer (parent/other) assisting you in your class? (Do NOT include parent volunteer help on schoolwide projects that are not directly related to your classroom, such as helping in the library or lunchroom.) \_\_\_\_\_
13. During the past four weeks, how many times has a volunteer (parent/other) assisted you on each of the following tasks:
  - A. Clerical assistance (telephoning, checking papers, running dittos, etc.).  
-----
  - B. Instructional assistance (individual tutoring, resource center work, working with small groups, etc.). \_\_\_\_\_
  - C. Leading the entire group in a lesson. \_\_\_\_\_
14. During the past four weeks, how many times did an aide or teacher assistant assist your class?



15. During the past four weeks, how many times did an aide perform the following tasks?
- A. Monitoring or supervising children at recess, lunch, etc. \_\_\_\_\_
  - B. Assisting you in preparing materials and performing other clerical duties.  
-----
  - C. Assisting you in instruction. \_\_\_\_\_
16. How many times in the past four weeks has a special teacher (music, art, etc.) taught your class? \_\_\_\_\_

*THANK YOU FOR YOUR ASSISTANCE!*

## Appendix D

Teacher Problem Checklist

Donald R. Cruickshank

Ohio State University

School _____	Date _____
Teacher Name _____	
Class Size: Number of Pupils _____	
Teacher Assistant? <input type="checkbox"/> No <input type="checkbox"/> Part-time <input type="checkbox"/> Full-time	

A problem arises when we have a goal and cannot achieve it. Everyone has problems, teachers included. Some problems result from the nature of the special work of teachers. It is important to know what teachers' problems are so that efforts can be made to consider and perhaps to reduce or eliminate them.

Directions

The problems on the checklist have been reported by teachers from across the country. They may reflect problems you encounter. Please respond to each statement in two ways.

Example: Look at the sample problem statement below and how one teacher has responded to it. As you read this problem statement (and all others in this checklist), mentally preface the statement with the words, "I have a problem. . . ."

"I Have a Problem. . . ."

How Frequently Does  
This Problem Occur?

How Bothersome  
Is This Problem?

1   2   3   4   5

1. Creating interest in the topic being taught.

1   2   3   4   5

The sample problem shows that the teacher felt that "creating interest in the topic being taught" is occasionally a problem but that when it happens it is extremely bothersome.

There are five choices related to the frequency of the problem and five choices related to the extent of its bothersomeness; therefore, many combinations are possible. Remember to circle the corresponding number under the frequency and under the bothersome column for each problem. Please do not leave any items blank. If you feel a statement does not apply to you or your situation, then it is not a problem for you, and should be marked "never" or "not at all."

"I HAVE A PROBLEM..."

<u>How Frequently Does This Problem Occur?</u>		<u>How Bothersome Is This Problem?</u>
1 2 3 4 5	1. Liking my students.	1 2 3 4 5
1 2 3 4 5	2. Getting students to participate in class.	1 2 3 4 5
1 2 3 4 5	3. Maintaining order, quiet or control.	1 2 3 4 5
1 2 3 4 5	4. Improving life for my students by correcting conditions both inside and outside school.	1 2 3 4 5
1 2 3 4 5	5. Having enough free time.	1 2 3 4 5
1 2 3 4 5	6. Getting my students to feel successful in school.	1 2 3 4 5
1 2 3 4 5	7. Getting students to behave appropriately.	1 2 3 4 5
1 2 3 4 5	8. Gaining professional knowledge, skills, and attitudes and using them effectively.	1 2 3 4 5
1 2 3 4 5	9. Controlling and using my professional time in the most functional, efficient way.	1 2 3 4 5
1 2 3 4 5	10. Understanding and helping the atypical or special child.	1 2 3 4 5
1 2 3 4 5	11. Getting cooperation and support from the administration.	1 2 3 4 5
1 2 3 4 5	12. Helping students who have personal problems.	1 2 3 4 5
1 2 3 4 5	13. Keeping my students away from things and people which may be a bad influence.	1 2 3 4 5
1 2 3 4 5	14. Planning instruction in different ways and for different purposes.	1 2 3 4 5
1 2 3 4 5	15. Responding appropriately to improper behavior such as obscenities.	1 2 3 4 5
1 2 3 4 5	16. Developing and maintaining student rapport, affection, and respect.	1 2 3 4 5

"I HAVE A PROBLEM..."

How Frequently Does  
This Problem Occur?

How Bothersome  
Is This Problem?

1 2 3 4 5	17. Assessing my students' learning.	1 2 3 4 5
1 2 3 4 5	18. Soliciting appropriate student behavior.	1 2 3 4 5
1 2 3 4 5	19. Improving conditions so that students can study better at home.	1 2 3 4 5
1 2 3 4 5	20. Having enough preparation time.	1 2 3 4 5
1 2 3 4 5	21. Extending learning beyond the classroom.	1 2 3 4 5
1 2 3 4 5	22. Controlling aggressive student behavior.	1 2 3 4 5
1 2 3 4 5	23. Getting my students to achieve competence in basic skills such as expressing themselves effectively in both writing and speaking.	1 2 3 4 5
1 2 3 4 5	24. Completing the work I have planned.	1 2 3 4 5
1 2 3 4 5	25. Promoting student self-evaluation.	1 2 3 4 5
1 2 3 4 5	26. Getting the understanding and sustenance of teachers and administrators so that I feel efficient and professional.	1 2 3 4 5
1 2 3 4 5	27. Helping students adjust socially or emotionally.	1 2 3 4 5
1 2 3 4 5	28. Establishing good relationships with parents and understanding home conditions.	1 2 3 4 5
1 2 3 4 5	29. Getting my students to value school marks and grades.	1 2 3 4 5
1 2 3 4 5	30. Enforcing considerate treatment of property.	1 2 3 4 5
1 2 3 4 5	31. Establishing and maintaining rapport with students and staff.	1 2 3 4 5
1 2 3 4 5	32. Helping students improve academically.	1 2 3 4 5
1 2 3 4 5	33. Enforcing social mores and folkways such as honesty and respect for teachers.	1 2 3 4 5

"I HAVE A PROBLEM..."

<u>How Frequently Does This Problem Occur?</u>		<u>How Bothersome Is This Problem?</u>
1 2 3 4 5	34. Encouraging parental interest in school matters.	1 2 3 4 5
1 2 3 4 5	35. Having enough time to teach and also to diagnose and evaluate learning.	1 2 3 4 5
1 2 3 4 5	36. Providing for individual learning differences.	1 2 3 4 5
1 2 3 4 5	37. Getting students to use their leisure time well.	1 2 3 4 5
1 2 3 4 5	38. Getting students to enjoy learning for its own sake.	1 2 3 4 5
1 2 3 4 5	39. Avoiding "housekeeping" duties inappropriate to my professional role (e.g., collecting lunch money, supervising bus duty).	1 2 3 4 5
1 2 3 4 5	40. Getting every student to work up to his or her ability.	1 2 3 4 5
1 2 3 4 5	41. Being professional in my relationships with staff.	1 2 3 4 5
1 2 3 4 5	42. Creating interest in the topic being taught.	1 2 3 4 5
1 2 3 4 5	43. Holding worthwhile conferences with parents.	1 2 3 4 5
1 2 3 4 5	44. Having students present and on time for all classes, rehearsals, games, etc.	1 2 3 4 5
1 2 3 4 5	45. Maintaining student attention.	1 2 3 4 5
1 2 3 4 5	46. Establishing and maintaining rapport with administrators and supervisors.	1 2 3 4 5
1 2 3 4 5	47. Learning to use alternative methods of instruction.	1 2 3 4 5
1 2 3 4 5	48. Eliminating inappropriate student behavior.	1 2 3 4 5

"I HAVE A PROBLEM..."

How Frequently Does  
This Problem Occur?

How Bothersome  
Is This Problem?

1 2 3 4 5

49. Understanding the conditions of the homes and community in which my students live.

1 2 3 4 5

1 2 3 4 5

50. Using time wisely to get both professional and personal things accomplished.

1 2 3 4 5

1 2 3 4 5

51. Guiding my students to do the things which will help them succeed in school.

1 2 3 4 5

1 2 3 4 5

52. Removing students who are sources of frustration.

1 2 3 4 5

1 2 3 4 5

53. Knowing how to differentiate between student learning and psychological problems.

1 2 3 4 5

1 2 3 4 5

54. Teaching too many students or large classes.

1 2 3 4 5

1 2 3 4 5

55. Vitalizing my students' interest in learning and improving their achievement.

1 2 3 4 5

1 2 3 4 5

56. Developing confidence in my colleagues.

1 2 3 4 5

1 2 3 4 5

57. Overcoming a student's feelings of upset or frustration with himself.

1 2 3 4 5

1 2 3 4 5

58. Assisting parents having difficulty with their children.

1 2 3 4 5

1 2 3 4 5

59. Overcoming student apathy or outright dislike.

1 2 3 4 5

1 2 3 4 5

60. Teaching self-discipline.

1 2 3 4 5

1 2 3 4 5

61. Directing the work of a teacher aide or volunteer assistant.

1 2 3 4 5

## Appendix E

Teacher Exit Interviews

Teacher's Name: \_\_\_\_\_

School Name: \_\_\_\_\_

Teacher's Class Size (number): \_\_\_\_\_ Aide: 1 No 2 Yes 3 Full-time

Teacher's Sex 1. Male 2. Female

Teacher's Race	1. White	2. Black	3. Asian
	4. Hispanic	5. American Indian	6. Other

Instructions to the Interviewer (Interviewer's Name \_\_\_\_\_ Date \_\_\_\_\_)Each topic (1-14) has three basic survey questions to be answered:

- A. Has there been a difference this year?
- B. How has there been a difference this year?
- C. Why has there been a difference this year?

Circle responses if possible. Ask "probe" questions and write responses in the space ONLY if needed.

**A. GROUPING**

1a. Has grouping of students in your class been different this year than last year?

- 1. Yes
- 2. No

Comments:

1b. How has grouping differed this year?

- |                   |                           |
|-------------------|---------------------------|
| 1. smaller groups | 4. fewer groups           |
| 2. larger groups  | 7. other (please comment) |
| 3. more groups    | 9. N/A                    |

Comments:

1c. Why do you think grouping differed this year?

- |                     |                           |
|---------------------|---------------------------|
| 1. small class size | 7. other (please comment) |
| 2. aide             | 9. N/A                    |

Comments:

**Probe Points**

- 1d. Ease of establishing and working with groups?
- 1e. Use of aides related to grouping practices?

**B. PHYSICAL ENVIRONMENT**

- 2a. Has the physical environment in your classroom been different this year than last year?
- 1. Yes      2. No

Comment:

- 2b. How has the physical environment differed this year?
- |                    |                           |
|--------------------|---------------------------|
| 1. space           | 5 noise level             |
| 2. equipment       | 6. traffic patterns       |
| 3. heating/cooling | 7. other (please comment) |
| 4. light           | 9. N/A                    |

Comment:

- 2c. Why do you think there were differences in the physical environment?
- |                     |                           |
|---------------------|---------------------------|
| 1. small class size | 7. other (please comment) |
| 2. aide             | 9. N/A                    |

Comment:

**Probe Points**

- 2d. Availability and use of space?
- 2e. Traffic patterns?

**C. LEARNING CENTERS**

- 3a. Has the use of learning centers in your classroom been different this year than last year?
- 1. Yes      2. No

Comment:

- 3b. How has use of learning centers differed this year?
- |                    |                           |
|--------------------|---------------------------|
| 1. more centers    | 4. larger centers         |
| 2. fewer centers   | 7. other (please comment) |
| 3. smaller centers | 9. N/A                    |

Comment:



3c. Why do you think that there were differences in the use of learning centers in your classroom this year?

- |                     |                           |
|---------------------|---------------------------|
| 1. small class size | 7. other (please comment) |
| 2. aide             | 9. N/A                    |

Comment:

#### **Probe Points**

- 3d. Types of centers?
- 3e. Use and quality of center time?
- 3f. Use of aides related to learning centers?

### **D. SOCIAL CLIMATE**

4a. Has the social climate in your classroom been different this year than last year?

1. Yes      2. No

Comment:

4b. How has the social climate been different this year?

- |                                    |  |
|------------------------------------|--|
| 1. students know each other better | 5. students are less cooperative         |
| 2. students help each other more   | 6. students exhibit more self-confidence |
| 3. students help each other less   | 7. other (please comment)                |
| 4. students are more cooperative   | 9. N/A                                   |

Comment:

4c. Why do you think that there is a difference in the social climate this year?

- |                     |                           |
|---------------------|---------------------------|
| 1. small class size | 7. other (please comment) |
| 2. aide             | 9. N/A                    |

Comment:

#### **Probe Points**

- 4d. Interpersonal relationships among children?
- 4e. Teacher's knowledge of individual children?
- 4f. Interpersonal relationships between teacher and children?

### **E. ENRICHMENT ACTIVITIES**

5a. Has use of enrichment activities in your class been different this year than last year?

1. Yes      2. No

Comment

5b. How has the use of enrichment activities differed this year?

- |                            |                           |
|----------------------------|---------------------------|
| 1. field trips             | 5. invited guests         |
| 2. center activities       | 6. cooking activities     |
| 3. special art/music/drama | 7. other (please comment) |
| 4. creative writing        | 9. N/A                    |

Comment:

5c. Why do you think the use of enrichment activities has differed this year?

- |                     |                           |
|---------------------|---------------------------|
| 1. small class size | 7. other (please comment) |
| 2. aide             | 9. N/A                    |

Comment:

### **Probe Points**

5d. Opportunities for enrichment activities?

5e. Use of aides related to enrichment activities?

### **F. CLASSROOM MANAGEMENT & DISCIPLINE: Part I**

6a. Has classroom management in your class been different this year than last?

1. Yes      2. No

Comment:

6b. How has classroom management been different this year?

- |                                     |                           |
|-------------------------------------|---------------------------|
| 1. reward systems                   | 7. other (please comment) |
| 2. student contracts or conferences | 9. N/A                    |
| 3. behavior modification techniques |                           |

Comment:

6c. Why do you think classroom management was different this year?

- |                     |                           |
|---------------------|---------------------------|
| 1. small class size | 7. other (please comment) |
| 2. aide             | 9. N/A                    |

Comment:

### **Probe Point**

6d. Use of behavior modification?

## **F. CLASSROOM MANAGEMENT & DISCIPLINE: Part II**

6a. Has discipline in your classroom been different this year than last year?

1. Yes      2. No

Comment:

6b. How has discipline been different this year?

- |                           |  |
|---------------------------|--|
| 1. more problems          | 5. students sent more frequently to office |
| 2. fewer problems         | 6. use of parent conferences               |
| 3. more severe punishment | 7. other (please comment)                  |
| 4. less severe punishment | 9. N/A                                     |

Comment:

6c. Why do you think discipline was different in your class this year?

- |                     |                           |
|---------------------|---------------------------|
| 1. small class size | 7. other (please comment) |
| 2. aide             | 9. N/A                    |

Comment:

### **Probe Points**

- 6d. Frequency and bothersomeness of discipline problems?
- 6e. Preventing discipline problems from happening?
- 6f. Dealing with discipline problems when they do happen?

## **G. MONITORING & EVALUATING PUPIL PROGRESS**

7a. Has monitoring and evaluating student progress in your class been different this year than last year?

1. Yes      2. No

Comment:

7b. How has monitoring and evaluating student progress been different this year?

- |                         |  |
|-------------------------|--|
| 1. more written testing | 5. different grading system                  |
| 2. less written testing | 6. more communication about student progress |
| 3. using homework more  | 7. other (please comment)                    |
| 4. using homework less  | 9. N/A                                       |

Comment:

7c. Why do you think that monitoring and evaluating student progress has different in your class this year?

- |                     |                           |
|---------------------|---------------------------|
| 1. small class size | 7. other (please comment) |
| 2. aide             | 9. N/A                    |

Comment:

**Probe Point**

7d. Ease in speed of monitoring/evaluating student progress?

**H. MORALE & ATTITUDE TOWARD WORK AS A TEACHER**

8a. Have your morale and attitude toward work as a teacher been different this year than last year?

1. Yes      2. No

Comment:

8b. How have your morale and work attitude differed this year?

- |                        |                                |
|------------------------|--------------------------------|
| 1. more sick days used | 5. fewer problems/frustrations |
| 2. less sick days used | 6. more problems/frustrations  |
| 3. less stress         | 7. other (please comment)      |
| 4. more stress         | 9. N/A                         |

Comment:

8c. Why do you think your morale and work attitude differed this year?

- |                     |                           |
|---------------------|---------------------------|
| 1. small class size | 7. other (please comment) |
| 2. aide             | 9. N/A                    |

Comment:

**Probe Points**

8d. Health and physical well-being?

8e. Mental well-being?

8f. Attitudes towards teaching?

**I. AMOUNT OR RATE OF STUDENT PROGRESS**

9a. Has the amount or rate of student progress in your class been different this year than last year?

1. Yes      2. No

Comment:

9b. How has the amount or rate of student progress differed this year?

- |   |  |
|---|--|
| 1. students progressed more rapidly     | 5. included reading and/or math enrichment materials |
| 2. students progressed at a slower rate |  |
| 3. covered all required material        | 7. other (please comment)                            |
| 4. did not cover all required material  | 9. N/A   |

Comment:

9c. Why do you think the amount or rate of student progress differed this year?

- |                     |                           |
|---------------------|---------------------------|
| 1. small class size | 7. other (please comment) |
| 2. aide             | 9. N/A                    |

Comment:

#### **Probe Point**

9d. Use of aide relative to amount or rate of material covered?

#### **J. PARENT/TEACHER RELATIONSHIPS**

10a. Have parent/teacher relations been different in your class this year than last year?

1. Yes      2. No

Comment:

10b. How have parent/teacher relations differed this year?

- |  |  |
|--|--|
| 1. more parent involvement                         | 5. parents worked with children individually |
| 2. less parent involvement                         | 6. more communication with parents           |
| 3. parents performed clerical duties               | 7. other (please comment)                    |
| 4. parents worked with children<br>in small groups | 9. N/A                                       |

Comment:

Jc. Why do you think parent/teacher relations differed this year?

- |                                    |                           |
|------------------------------------|---------------------------|
| 1. small class                     | 7. other (please comment) |
| 2. aide                            | 9. N/A                    |
| 4. parents had less time available |                           |

Comment:

#### **Probe Points**

10d. Use of parents in the classroom?

10e. Frequency and type of communication with parents?

10f. Problems working with parents?

#### **K. TEACHER AIDES**

11a. Has your use of teacher aides been different in your class this year than last year?

1. Yes      2. No

Comment:

11b. How has your use of teacher aides differed this year?

- |  |                                  |
|--|----------------------------------|
| 1. aide duties were mostly clerical                      | 5. aide received training        |
| 2. aide duties were mostly instructional                 | 6. aide did not receive training |
| 3. aide was a teaching assistant                         | 7. other (please comment)        |
| 4. aide duties included routine activities with children | 9. N/A                           |

Comment:

11c. Why do you think the use of teacher aides differed this year?

- |                                 |                           |
|---------------------------------|---------------------------|
| 1. had a full-time teacher aide | 7. other (please comment) |
| 2. had a part-time teacher aide | 9. N/A                    |
| 3. did not have a teacher aide  |                           |

Comment:

#### **Probe Points**

11d. Quality of aide?

11e. Aide duties - what the aide does?

#### **L. INSTRUCTION**

12a. Has instruction been different in your class this year than last year?

1. Yes      2. No

Comment:

12b. How has instruction differed this year?

- |                                 |                           |
|---------------------------------|---------------------------|
| 1. more whole group instruction | 4. less individualization |
| 2. more small group instruction | 7. other (please comment) |
| 3. more individualization       | 9. N/A                    |

Comment:

12c. Why do you think instruction differed this year?

- |                     |                           |
|---------------------|---------------------------|
| 1. small class size | 7. other (please comment) |
| 2. aide             | 9. N/A                    |

Comment:

#### **Probe Points**

12d. Instructional goals, techniques, and materials?

12e. Time for instruction?

12f. Amount of structure in instruction?

**M. TEACHER PLANNING & PREPARATION**

13a. Has your planning and preparation been different in your class this year than last year?

1. Yes      2. No

Comment:

13b. How has planning and preparation differed this year?

- |   |                                    |
|---|------------------------------------|
| 1. more time for planning and preparation | 4. better planning and preparation |
| 2. less time for planning and preparation | 7. other (please comment)          |
| 3. assistance in planning and preparation | 9. N/A                             |

Comment:

13c. Why do you think planning and preparation differed this year?

- |                     |                           |
|---------------------|---------------------------|
| 1. small class size | 7. other (please comment) |
| 2. aide             | 9. N/A                    |

Comment:

**Probe Points**

- 13d. Time for planning and preparation?  
 13e. Paperwork and record keeping?  
 13f. Use of aides in planning and preparation?

**N. INDIVIDUAL ATTENTION TO STUDENTS**

14a. Has your individual attention to students been different this year than last year?

1. Yes      2. No

Comment:

14b. How has your individual attention to students differed this year?

- |                                  |                              |
|----------------------------------|------------------------------|
| 1. more reinforcement/reteaching | 4. less classroom counseling |
| 2. less reinforcement/reteaching | 7. other (please comment)    |
| 3. more classroom counseling     | 9. N/A                       |

Comment:

14c. Why do you think individual attention to students differed this year?

- |                     |                           |
|---------------------|---------------------------|
| 1. small class size | 7. other (please comment) |
| 2. aide             | 9. N/A                    |

Comment:

**Probe Points**

- 14d. Individual instruction (reinforcement and reteaching)?
- 14e. Counseling?
- 14f. Time for individual attention?

**O. OTHER COMMENTS**

15a. Are there any other areas that were different this year than last year? More? \_\_\_\_\_  
 Less \_\_\_\_\_? Same \_\_\_\_\_?

YES NO

-----  
 (topic)

15b. How has \_\_\_\_\_ been different this year?  
 (topic)

15c. Why do you think there has been a difference this year?  
 Small class Aide other (please comment)

Comment:

16a. Are there any other areas that were different this year than last year?

YES NO

-----  
 (topic)

16b. How has \_\_\_\_\_ been different this year?  
 (topic)

16c. Why do you think there has been a difference this year?  
 Small class Aide other (please comment)

Comment:

17 If you had your choice, which teaching situation would you choose:

- 1. a small class with 15 children
- 2. a regular class with 25 children with a full-time aide

18. If you had your choice, which teaching situation would you choose:

- 1. a small class with 15 children
- 2. a \$2,500 salary increase

19. What support should school personnel provide that would make teaching better next year?

20. Are there any additional comments that you would like to make?



## Appendix F

Burke County Narrative Questionnaire

UNIVERSITY OF NORTH CAROLINA  
AT GREENSBORO  
School of Education

## MEMORANDUM

Memo: Teachers in Burke County  
From: C.M. Achilles

Date: May 16, 1994  
Topic: Class-Size

We need some narrative information from teachers about the issue of classes of about 1:15 in early primary grades. The information will be anonymous and voluntary, but a little background information would be helpful. Omit this background information if you choose, but please provide anecdotes and opinions about the 1:15 class size initiative. PLEASE PRINT OR TYPE YOUR RESPONSE. Use added sheets if needed.

Year of Teaching \_\_\_\_\_ Grade \_\_\_\_\_ Size of class (1993-94) \_\_\_\_\_

1. Benefits of class of about 1:15?

2. Problems in class of about 1:15?

3. If you have taught in larger classes (e.g., 1:25 or more) in the past, what are major differences between the two conditions (1:25 vs 1:15)? What is the greatest difference?

4. Comments?

## Appendix G

Sample PIT Coding Sheets

X = "Experimental" or Study School  
 O = Control School  
 YR = Year-Around Calendar

PIT = Basic Observation Method (French & Galloway, nd)  
 P = Personal Events  
 I = Institutional Events ("Playing School")  
 T = Task Events  
 i = individual focus  
 g = group focus  
 M = Mixed Events  
 ≡ = Pause or Break in Coding  
 O = A Circle around a PIT Event indicates that the action was done by someone other than the Teacher of the class (Aide, Supervisor, Volunteer)  
 (K), (1), etc. = Grade designation in ( )  
 Y = YES (for Coding Sheets)

EVENT/COMMUNICATION EVENT (French & Galloway, nd, p. 2)

A communication event . . . (is) sequence of teacher-pupil communicative behaviors separated from preceding and succeeding sequences of behaviors (events) by naturally occurring boundaries. As defined by Galloway (1962), these boundaries are: (1) a variation or change in the direction of the teacher's communicative behavior; (2) a change in the teacher's behavior toward a new interaction; (3) the occurrence of a significant or potent act which appears influential; and (4) social intervention in which an interruption is instigated by either a pupil or the teacher. As implied, communication events are composed of both verbal and nonverbal behaviors by both teachers and pupils. It is not uncommon to find an entire event composed entirely of nonverbal behaviors.

Coding Time = Approximately every 4-5 seconds and/or at a Change of Communication Event.

## Appendix H

Informed Consent Form

Directions: Please respond to every item. Read and sign the consent form if you are willing to participate in this study. Thank you.

Name: \_\_\_\_\_

Date of birth: \_\_\_\_/\_\_\_\_/\_\_\_\_ Sex: F \_\_\_\_ M \_\_\_\_

Experience in education (years): \_\_\_\_

Education (check highest level):

<input type="checkbox"/> some high school	<input type="checkbox"/> Bachelors	<input type="checkbox"/> Masters plus
<input type="checkbox"/> high school grad	<input type="checkbox"/> Bachelors plus	<input type="checkbox"/> Specialist (CAS)
<input type="checkbox"/> some college	<input type="checkbox"/> Masters	<input type="checkbox"/> Doctorate

Race/ethnicity: ☐ Black ☐ Asian ☐ American Indian  
☐ White ☐ Hispanic ☐ Other (\_\_\_\_\_)

Role/job: ☐ Teacher ☐ Administrator  
☐ Aide/assistant ☐ Other (\_\_\_\_\_)

Informed Consent

I understand that I am participating in a study of class-size effects in public schools. This study may help educators by identifying benefits of small-class participation of teachers and pupils. All data will be treated as group data and no individual will be identified other than as a member of a group (e.g., teachers of small classes, or teacher assistants). I also understand that my participation is voluntary and that I may withdraw from participating at any time; I may ask questions at any time to clarify issues related to the study.

Data to be collected will include observations, student test results, questionnaire responses, participant demographics, and possibly anecdotes/artifacts or examples, and some interview information. At the conclusion of the project, data collected for the project will be destroyed, unless participants want their own data for their own use.

Procedures and data reflect usual school activities and one would anticipate that there is no potential for "risk" to any participant.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

## Appendix I

Rater Agreements

	<b>A</b>			<b>Expert</b>			<b>Computations</b>				<b>TOT</b>	
	1	2	TOT	1	2	TOT	<b>1</b>		<b>2</b>		DIF	%
							DIF	%	DIF	%		
TOT Events	45	33	78	42	31	73	3	93	2	94	5	93
Changes	16	12	28	17	12	29	1	94	0	100	1	97
Group	9	6	15	10	6	16	1	90	0	100	1	94
Indiv.	7	6	13	7	6	13	0	100	0	100	0	100
P	1	0	1	1	0	1	0	100	0	100	1	100
I	6	0	6	5	0	5	1	80	0	100	1	80
T	38	33	71	36	31	67	2	94	2	93	4	94

	<b>B</b>		<b>Expert</b>		<b>Computations</b>	
	TOT		TOT		DIF	%
TOT Events	125		121		4	97
Changes	14		15		1	93
Group	36		37		1	97
Indiv.	89		84		5	94
P	1		1		0	100
I	0		0		0	100
T	13		14		1	93

## Appendix J

Worksheets/Raw Data Inter-Rater Agreements

<u>Numbers</u>										
	<u>TASK</u>			<u>INSTIT.</u>			<u>PERS</u>			<u>MIX</u>
<u>GRADE</u>	<u>g</u>	<u>i</u>	<u>TOT</u>	<u>g</u>	<u>i</u>	<u>TOT</u>	<u>g</u>	<u>i</u>	<u>TOT</u>	<u>TOT</u>
K	62	114	176	22	18	40	0	9	9	0
1	65	73	138	21	5	26	0	4	4	9
2	50	16	66	29	6	35	0	0	0	0
TOT	177	203	380	72	29	101	0	13	13	9

<u>Percents</u>										
<u>GRADE</u>	<u>g</u>	<u>i</u>	<u>TOT</u>	<u>g</u>	<u>i</u>	<u>TOT</u>	<u>g</u>	<u>i</u>	<u>TOT</u>	<u>TOT</u>
K row	28	51	78	10	8	18	0	4	4	0
Event	35	65	100	55	45	100	0	100	100	0
1 row	37	41	78	12	3	15	0	2	2	5
Event	47	53	100	81	19	100	0	100	100	100
2 row	50	16	66	29	6	34	0	0	0	0
Event	76	24	100	83	17	100	0	0	0	0
TOT row	35	41	76	14	6	20	0	3	3	2
Event	47	53	100	72	29	101*	0	100	100	100

\*Total may not equal 100% due to rounding.

## Appendix K

ANOVA and ANCOVA AnalysesSchool v. Pre SS

## Analysis of Variance Table

Source:	DF:	Sum Squares:	Mean Square:	F-test:
Between groups	1	70162.684	70162.684	8.89
Within groups	101	797250.772	7893.572	p = .0036
Total	102	867413.456		

Model II estimate of between component variance = 1218.412

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
Sch#1	56	305.64	90.68	12.118
Sch#2	47	358.04	86.60	12.632

Comparison:	Mean Diff.:	Fisher PLSD:	Scheffe F-test:	Dunnett t:
Sch#1 vs. Sch#2	52.4	34.689*	8.889*	2.9481

\*Significant at 95%

School v. Post SS

## Analysis of Variance Table

Source:	DF:	Sum Squares:	Mean Square:	F-test:
Between groups	1	43181.66	43181.66	4.24
Within groups	101	1029691.90	10194.97	p = .0422
Total	102	1072873.55		

Model II estimate of between component variance = 645.446

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
Sch#1	56	407.79	101.59	13.58
Sch#2	47	448.89	100.22	14.62

Comparison:	Mean Diff.:	Fisher PLSD:	Scheffe F-test:	Dunnett t:
Sch#1 vs. Sch#2	-41.108	39.627*	4.236*	2.058

\*Significant at 95%

Teacher v. Pre SS

Analysis of Variance Table

Source:	DF:	Sum Squares:	Mean Square:	F-test:
Between groups	6	127183.778	21197.296	2.75
Within groups	96	740229.679	7710.726	p = .0165
Total	102	867413.456		

Model II estimate of between component variance = 922.797

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
T.A1	14	304.36	75.11	20.08
T.A2	12	343.58	92.56	26.72
T.A3	16	266.13	65.67	16.42
T.A4	14	319.57	116.03	31.01
T.B1	10	388.70	49.75	15.73
T.B2	18	348.22	95.58	22.53
T.B3	19	351.21	92.91	21.32

Comparison:	Mean Diff.:	Fisher PLSD:	Scheffe F-test:	Dunnnett t:
T.A1 vs. T.A2	-39.23	68.58	0.22	1.14
T.A1 vs. T.A3	38.23	63.80	0.24	1.19
T.A1 vs. T.A4	-15.21	65.89	0.04	0.46
T.A1 vs. T.B1	-84.34	72.175*	0.90	2.32
T.A1 vs. T.B2	-43.87	62.12	0.33	1.40
T.A1 vs. T.B3	-46.85	61.40	0.38	1.52
T.A2 vs. T.A3	77.46	66.57*	0.89	2.31
T.A2 vs. T.A4	24.01	68.58	0.08	0.70
T.A2 vs. T.B1	-45.12	74.64	0.24	1.20
T.A2 vs. T.B2	-4.64	64.97	0.00	0.14
T.A2 vs. T.B3	-7.63	64.28	0.01	0.24
T.A3 vs. T.A4	-53.45	63.80	0.46	1.66
T.A3 vs. T.B1	-122.58	70.271*	2.00	3.46
T.A3 vs. T.B2	-82.10	59.895*	1.23	2.72
T.A3 vs. T.B3	-85.09	59.149*	1.36	2.86
T.A4 vs. T.B1	69.13	72.18	0.60	1.90
T.A4 vs. T.B2	-28.65	62.12	0.14	0.92
T.A4 vs. T.B3	-31.64	61.40	0.17	1.02
T.B1 vs. T.B2	40.48	68.75	0.23	1.17
T.B1 vs. T.B3	37.49	68.10	0.20	1.09
T.B2 vs. T.B3	-2.99	57.34	0.00	0.10

\*Significant at 95%

Teacher v. Post SS

Analysis of Variance Table

Source:	DF:	Sum Squares:	Mean Square:	F-test:
Between groups	6	100900.423	16816.737	1.66
Within groups	96	971973.13	10124.72	p = .139
Total	102	1072873.553		

Model II estimate of between component variance = 457.89

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
T.A1	14	420.21	80.70	21.57
T.A2	12	435.58	100.14	28.91
T.A3	16	373.44	103.84	25.96
T.A4	14	410.79	117.85	31.50
T.B1	10	470.80	54.69	17.29
T.B2	18	418.39	114.39	26.96
T.B3	19	466.26	101.49	23.28

Comparison:	Mean Diff.:	Fisher PLSD:	Scheffe F-test:	Dunnett t:
T.A1 vs. T.A2	-15.37	78.58	0.03	0.39
T.A1 vs. T.A3	46.78	73.10	0.27	1.27
T.A1 vs. T.A4	9.43	75.50	0.01	0.25
T.A1 vs. T.B1	-50.59	82.71	0.25	1.21
T.A1 vs. T.B2	1.83	71.18	0.00	0.05
T.A1 vs. T.B3	-46.05	70.36	0.28	1.30
T.A2 vs. T.A3	62.15	76.28	0.44	1.62
T.A2 vs. T.A4	24.80	75.58	0.07	0.63
T.A2 vs. T.B1	-35.22	85.53	0.11	0.82
T.A2 vs. T.B2	17.19	74.44	0.04	0.46
T.A2 vs. T.B3	-30.68	73.66	0.11	0.83
T.A3 vs. T.A4	-037.35	73.10	0.17	1.01
T.A3 vs. T.B1	-97.36	80.52	0.96	2.40
T.A3 vs. T.B2	-44.95	68.63	0.28	1.30
T.A3 vs. T.B3	-92.83	67.78	1.23	2.72
T.A4 vs. T.B1	-60.01	82.71	0.35	1.44
T.A4 vs. T.B2	-7.60	71.18	0.01	0.21
T.A4 vs. T.B3	-55.48	70.36	0.41	1.57
T.B1 vs. T.B2	52.41	78.78	0.29	1.32
T.B1 vs. T.B3	4.54	78.04	0.00	0.12
T.B2 vs. T.B3	-47.87	65.70	0.35	1.45

\*Significant at 95%



## Type III Sums of Squares

Source	df	Sum of Squares	Mean Square	F-Value	P-Value
School	1	192.994	192.994	.043	.8354
Pre SS	1	574333.128	574333.128	129.136	.0001
School * Pre SS	1	383.510	383.510	.086	.7696
Residual	99	440302.649	4447.502		

Dependent: Post SS

## Means Table

Effect: School

Dependent: Post SS

	Count	Mean	Std. Dev.	Std. Error
Sch#1	56	407.786	101.594	13.576
Sch#2	47	448.894	100.219	14.618

## Scheffe's S

Effect: School

Dependent: Post SS

Significance level: .05

	Vs.	Diff.	Crit. diff.	P-value	
Sch#1	Sch#2	41.108	26.177	.0024	S

S = Significantly different at this level.

## Model Summary

Dependent: Post SS

Count	103
R	.768
R-Squared	.590
Adj. R-Squared	.577
RMS Residual	66.690

	df	Sum of Squares	Mean Square	F-value	P-value
Model	3	632570.905	210856.968	47.410	.0001
Error	99	440302.649	4447.502		
Total	102	1072873.553			

Model Coefficient Table  
Dependent: Post SS

		Beta	Std. Error	t-Test	P-value
Intercept		150.136	41.801	3.592	.0005
School	Sch#1	-10.915	52.397	-.28	.8354
	Sch#2	0.000	.	.	.
Pre SS		.834	.114	7.349	.0001
School * Pre SS	Sch#1, Pre SS	.044	.151	.294	.7696
	Sch#2, Pre SS	0.000	.	.	.

Residual Summary  
Dependent: Post SS

SS [e(i)-e(i-1)]	891024.013
number >= 0	53
number < 0	50
Durbin-Watson	2.024
Serial Autocorrelation	-.013

## Type III Sums of Squares

Source	df	Sum of Squares	Mean Square	F-Value	P-Value
School	1	7.885	7.885	.002	.9674
Pre SS	1	558126.060	558126.060	119.245	.0001
School * Pre SS	1	51.186	51.186	.011	.9169
Residual	89	4165464.483	4680.500		

Dependent: Post SS

## Means Table

Effect: School

Dependent: Post SS

	Count	Mean	Std. Dev.	Std. Error
Sch#1	56	407.786	101.594	13.576
Sch#2	37	442.973	109.165	17.947

## Model Summary

Dependent: Post SS

Count	93
R	.770
R-Squared	.593
Adj. R-Squared	.580
RMS Residual	68.414

	df	Sum of Squares	Mean Square	F-value	P-value
Model	3	607701.216	202567.072	43.279	.001
Error	89	416564.483	4680.500		
Total	92	1024265.699			

## Model Coefficient Table

Dependent: Post SS

		Beta	Std. Error	t-Test	P-value
Intercept		141.477	44.373	3.188	.0020
School	Sch#1	-2.255	54.948	-.041	.9674
	Sch#2	0.000	•	•	•
Pre SS		.862	.123	7.024	.0001
School * Pre SS	Sch#1, Pre SS	.017	.159	.105	.9169
	Sch#2, Pre SS	0.000	•	•	•

## Residual Summary

Dependent: Post SS

SS[e(i)-e(i-1)]	838228.836
number >= 0	48
number < 0	45
Durbin-Watson	2.012
Serial Autocorrelation	-.008

## Type III Sums of Squares

Source	df	Sum of Squares	Mean Square	F-Value	P-Value
Teacher+	6	22856.625	3809.438	.948	.5357
Pre SS	1	334960.450	334960.450	74.654	.0001
Teacher+ *Pr...	6	18138.082	3023.014	.674	.6711
Residual	89	399326.365	4486.813		

Dependent: Post SS

## Means Table

Effect: Teacher+

Dependent: Post SS

	Count	Mean	Std. Dev.	Std. Error
T.A1	14	420.214	80.6948	21.567
T.A2	12	435.583	100.137	28.907
T.A3	16	373.438	103.836	25.959
T.A4	14	410.786	117.848	31.496
T.B1	10	470.800	54.687	17.293
T.B2	18	418.389	114.386	26.961
T.B3	19	466.263	101.487	23.283

Scheffe's S  
 Effect: Teacher+  
 Dependent: Post SS  
 Significance level: .05

	Vs.	Diff.	Crit. diff.	P-value	
T.A3	T.A4	37.348	89.107	.8857	S
	T.B2	44.951	83.660	.7013	
	T.A1	46.777	89.107	.7242	
	T.A2	62.146	92.983	.4412	
	T.B3	92.826	82.618	.0159	
	T.B1	97.362	98.153	.0536	
T.A4	T.B2	7.603	86.766	1.0000	
	T.A1	9.429	92.030	.999	
	T.A2	24.798	95.787	.9891	
	T.B3	55.477	85.762	.4835	
	T.B1	60.014	100.813	.5874	
T.B2	T.A1	1.825	86.766	1.0000	
	T.A2	17.194	90.742	.9980	
	T.B3	47.874	80.087	.5825	
	T.B1	52.411	96.033	.6852	
T.A1	T.A2	15.369	95.787	.9992	
	T.B3	46.049	85.762	.7019	
	T.B1	50.586	100.813	.7653	
T.A2	T.B3	30.680	849.782	.9551	
	T.B1	35.217	104.255	.9576	
T.B3	T.B1	4.537	95.126	1.0000	

S = Significantly different at this level.

Model Summary  
 Dependent: Post SS

Count 103  
 R .792  
 R-Squared .628  
 Adj. R-Squared .573  
 RMS Residual 66.984

	df	Sum of Squares	Mean Square	F-value	P-value
Model	13	673547.188	51811.322	11.547	.0001
Error	89	399326.365	4486.813		
Total	102	1072873.553			

Model Coefficient Table  
Dependent: Post SS

		Beta	Std. Error	t-Test	P-value
Intercept		196.047	61.627	3.181	.0020
Teacher+	T.A1	24.449	94.920	.247	.8054
	T.A2	-62.944	948.958	-.636	.5264
	T.A3	-155.903	94.817	-1.644	.1037
	T.A4	-60.202	82.077	-.733	-.4652
	T.B1	75.092	186.221	.403	.6877
	T.B2	-107.303	86.895	-1.235	.2201
	T.B3	0.000	•	•	•
Pre SS		.769	.170	4.528	.0001
School * Pre SS	T.A1, Pre SS	-.113	.300	-.377	.7069
	T.A2, Pre SS	.111	.277	.401	.6892
	T.A3, Pre SS	.483	.313	1.541	.1268
	T.A4, Pre SS	.091	.233	.390	.6978
	T.B1, Pre SS	-.256	.480	-.533	.5954
	T.B2, Pre SS	.177	.240	.738	.4627
	T.B3, Pre SS	0.000	•	•	•

Residual Summary  
Dependent: Post SS

SS[e(i)-e(i-1)]	892497.918
number >= 0	55
number < 0	48
Durbin-Watson	2.235
Serial Autocorrelation	-.120

## Type III Sums of Squares

Source	df	Sum of Squares	Mean Square	F-Value	P-Value
Teacher+	5	20217.293	4043.459	.866	.5078
Pre SS	1	493829.698	493829.698	105.740	.0001
Teacher+ *Pr...	5	15294.850	3058.970	.655	.6585
Residual	81	378288.2948	4670.266		

Dependent: Post SS

## Means Table

Effect: Teacher+

Dependent: Post SS

	Count	Mean	Std. Dev.	Std. Error
T.A1	14	420.214	80.698	21.567
T.A2	12	435.583	100.137	28.907
T.A3	16	373.438	103.836	25.959
T.A4	14	410.786	117.848	31.496
T.B2	18	418.389	114.386	26.961
T.B3	19	466.263	101.487	23.283

## Model Summary

Dependent: Post SS

Count	93
R	.794
R-Squared	.631
Adj. R-Squared	.581
RMS Residual	68.339

	df	Sum of Squares	Mean Square	F-value	P-value
Model	11	645977.400	58725.218	12.574	.0001
Error	81	378288.298	4670.226		
Total	92	1024265.699			



Model Coefficient Table  
Dependent: Post SS

		Beta	Std. Error	t-Test	P-value
Intercept		196.047	62.874	3.118	.0025
Teacher+	T.A1	24.449	100.921	.242	.8092
	T.A2	-62.944	100.961	-.623	.5347
	T.A3	-155.903	96.735	-1.612	.1109
	T.A4	-60.202	83.738	-.719	.4743
	T.B2	-107.303	88.653	-1.210	.2297
	T.B3	0.000			
Pre SS		.769	.173	4.438	.0001
School * Pre SS	T.A1, Pre SS	-.113	.306	-.370	.7126
	T.A2, Pre SS	.111	.282	.393	.6951
	T.A3, Pre SS	.483	.320	1.511	.1348
	T.A4, Pre SS	.091	.238	.382	.7036
	T.B2, Pre SS	.177	.245	.723	.4718
	T.B3, Pre SS	0.000	.	.	.

Residual Summary  
Dependent: Post SS

SS[e(i)-e(i-1)]	835543.042
number >= 0	49
number < 0	44
Durbin-Watson	2.209
Serial Autocorrelation	-.107

## Appendix L

Immediate Observable Benefits of Class Size of 15

1. More individual attention.
2. More personal space for each student.
3. More personal teacher-student conversations.
4. More time to diagnose how the students are thinking and to determine their understandings and misunderstandings.
5. More time to diagnose and develop their most successful learning style.
6. More time to get to know each student and their families -- a message to parents that the teacher really cares because she knows all about us.
7. More time for students to get to know each other.
8. More time for teacher to develop sense of community among classmates, connect the students with other big sister/big brother classes in the school.
9. More students reading on more advanced levels.
10. More students understanding math concepts, not simply writing numbers and number facts.
11. All students participating in "seminars" discussing literature on their level, making concept connections and thinking about human values.
12. More self-confidence for learning regardless of abilities.
13. Wide range of abilities able to learn together. Fewer students are referred to the office.
14. More time and space to develop hands on/discovery learning rather than relying on mostly didactic, teacher controlled learning.
15. More time to give "troubled kids" the attention they so desperately need, reducing the likelihood of their becoming a discipline problem.
16. More energy for collegial planning that led us to well thought out, creative "webbing" thematic lessons.
17. A sense of peacefulness in the class.

Immediate Observable Outcomes of Class Size of 24

1. I cannot meet all subject needs daily.
2. I used to have daily reading conferences. Now I read individually with each child about two times weekly.
3. I feel frustrated that in the critical first grade year, I cannot assess their reading individually and specify the focus they need.
4. They use to read to me every day. They still want to and it seems to hurt their feelings if they can't.
5. This at risk population needs daily help. I want to give that help but can't get to them as often as they need.
6. I don't know the children as well.
7. During each lesson now, each child does not get to answer. Last year each child answered three and four times in each lesson.
8. Lessons are 15 to 25 minutes longer as I check all children. I do more "up front" teaching. This leaves little time for students to do the independent exploratory learning and thinking.
9. There are more student conflicts in the classroom.
10. There is less space for each child.
11. I have to move on before all students have learned. Last year I could make sure every child did and learned what they were supposed to.
12. Students do not present their work orally as much. Oral communication is a major need.